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TM 9-2300-216-34-1

TECHNICAL MANUAL

DIRECT AND GENERAL SUPPORT MAINTENANCE MANUAL

GUN, FIELD ARTILLERY, SELF-PROPELLED:

175-MM, M107 (2350-00-436-6635)

AND

HOWITZER, HEAVY, SELF-PROPELLED:

8-INCH, M110 (2350-00-439-6243)

AND

HOWITZER, HEAVY, SELF-PROPELLED:

8-INCH, M110A1 (2350-01-013-3914)

HULL AND RELATED COMPONENTS

HEADQUARTERS, DEPARTMENT OF THE ARMY

APRIL 1977

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TECHNICAL MANUAL
No. 9-2300-216-34/1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
WASHINGTON, DC *30 April 1977*

Direct Support and General Support Maintenance Manual for GUN, FIELD ARTILLERY, SELF-PROPELLED: 175-MM, M107 (2350-00-436-6635), HOWITZER, HEAVY, SELF-PROPELLED: 8-INCH, M110 (2350-00-439-6243), AND HOWITZER, HEAVY, SELF-PROPELLED: 8-INCH, M110A1 (2350-01-013-3914) HULL AND RELATED PARTS

REPORTING OF ERRORS

You can improve this manual by recommending improvements using DA Form 2028 (Recommended Changes to Publications and Blank Forms) or DA Form 2028-2 (Test) located in the back of the manual and mail the form direct to Commander, US Army Tank-Automotive Materiel Readiness Command, ATTN: DRSTA-MCP, Warren, MI 48090. A reply will be furnished direct to you.

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CHAPTER 1
INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This technical manual contains instructions for direct support and general support maintenance of the Gun, Field Artillery, Self-Propelled: 175-MM, M107 and Howitzer, Heavy, Self-Propelled: 8-inch, M110 and M110A1. It contains descriptions of, and procedures for, removal, disassembly, inspection, repair, and assembly of the hull and related components.

b. Appendix A contains a list of current references, including supply manuals, forms, technical manuals, and other available publications applicable to the M107 Gun Vehicle and M110/M110A1 Vehicles.

1-2. Direct Support and General Support Maintenance Allocation

Refer to the maintenance allocation chart (MAC), TM 9-2300-216-20, to determine maintenance functions assigned to direct support and general support maintenance personnel. Refer to TM 9-2300-216-34P-1 for listing of repair parts and special tools available to direct support and general support maintenance personnel.

1-3. Maintenance Forms and Records

Maintenance forms, records, and reports which are to be used by maintenance personnel at all maintenance levels are listed in and prescribed by TM 38-750.

Section II. DESCRIPTION AND DATA

1-4. General

The M107 Gun Vehicle and M110/M110A1 Howitzer Vehicles are all-welded steel-hulled full-tracked, self-propelled weapons. All three have a cannon mounted on a turret ring and bearing arrangement on the rear half of the vehicle. The turret rotates to 30 degrees either side of the vehicle centerline. Vehicle power is generated by a power plant that consists of a V-8 engine, power transfer unit, and transmission as one integral assembly located in the front of the hull. The vehicle is operated from the driver's compartment which is also located in the left front of the hull. Refer to TM 9-2300-216-20 for tabulated data of general characteristics and performance of the M107 Gun Vehicle and M110/M110A1 Howitzer Vehicles and refer to chapters for data for specific vehicle assemblies covered in this manual. The following are brief descriptions of the vehicles' major operating systems.

a. Powerplant. The powerplant is composed of a General Motors diesel 8V71T series, model 7083-7398, eight-cylinders, V-type, two-cycle, turbocharged, liquid-cooled engine and an Allison model XTG-411-2A power train which is a combined cross-drive type combination transmission, power transfer, steering, and braking assembly. The powerplant is removed and installed as a unit. Separation of the engine from the transmission is accomplished with the powerplant removed from the vehicle. The powerplant generates electrical power through the auxiliary drive assembly to a generator, and motive power through final drives. Refer to paragraph 5-1 for a description of the powerplant components, to TM 9-2815-202-34 for a detailed description of the engine, and to TM 9-2520-234-35 for a detailed description of the powertrain.

b. Air Intake. Engine operating air is supplied by a two-stage, dry-air cleaner system that draws atmospheric air through the battery compartment grille into vortex-type air separators. The separators are tubes and vanes that impart a swirling motion to the air so the centrifugal action will remove the large dust particles from the air stream. Replaceable filters then collect the remaining dust as clean air is ducted through the fuel cell to the engine, turbocharger, engine blower and combustion chambers.

c. Engine Cooling System. The engine and other components in the powerplant compartment are cooled by a combined liquid and air circulating system. Engine heat is dissipated by circulating liquid coolant through the engine and two radiators. Heat is transferred from the water in the radiator to forced air from the cooling fan assembly. The air flows through the radiators, then the powerplant compartment and is exhausted through ports in the right side of the hull. On "B" vehicles, the cooling system is equipped with an aeration detector that warns the driver of air trapped in the cooling system or of low coolant level.

d. Electrical System. Electrical power for the vehicle is provided by a 24-volt, 300-ampere generator when the engine is running or by four series-parallel connected 12-volt, 100-ampere-hour, wet type storage batteries. The generator charges the batteries and supplies extra power required at peak loads. The output of the generator is controlled by a voltage regulator. A system of electrical components is controlled by switches and is monitored on indicators located in the driver's compartment. A system of electrical leads and harnesses distributes electrical power to the various electrical components. An electrical connector receptacle is located on the exterior of the vehicle left side; it enables connection of the vehicle electrical system to an external source of electrical power. Refer to TM

9-2300-216-20 for description of electrical components.

e. Auxiliary Drive. The auxiliary drive is a differential type gear box, drive shaft and magnetic clutch. The auxiliary drive is connected to and driven by a power take-off unit mounted on the transmission transfer case, and furnishes positive drive to the generator and cooling fan. A driver operated switch energizes the magnetic clutch to provide optional operation of the hydraulic pumps. Refer to paragraph 6-1 for a description of the auxiliary drive.

f. Suspension System. The suspension system consists of track assemblies, final drives, wheels, arms, torsion bars and lockout cylinders. Eight pairs of roadwheels and two pairs of idler wheels (one on each side) support the vehicle on two track assemblies. The rubber tired wheels travel on the centerguide alined track assemblies on each side of the vehicle. The main purpose of the idler wheels is to maintain track tension. Drive sprockets attach rubber-padded, steel-shoe track assemblies to final drives at the front of the hull. Each pair of road wheels is mounted on the hub of an arm and hub assembly which is, in turn, linked to a torsion bar and a hydraulic suspension lockout cylinder.

NOTE

M107 vehicle serial numbers 1 through 296, M110/M110A1 vehicles serial numbers 1 through 412 and M110A1 vehicles serial numbers 1-1 through 296-1 were initially equipped with ten lockout cylinders. M107 vehicles serial numbers 297 and on, M110/M110A1 vehicle serial numbers 413 and on and M110A1 vehicle serial numbers 297-1 and on are equipped with eight lockout cylinders.

The cylinder acts as a shock absorber, a bump stop, and a suspension lockout device. When the lockout cylinders are in the lockout condition, the road wheel arms cannot move up or down and the chassis provides a rigid platform for firing operations. Refer to TM 9-2300-216-20 for a more complete description of the suspension system.

g. Controls and Linkages. The driver's compartment contains controls and instruments necessary for operating the vehicle. The brake, throttle, and steering controls are located in front of the driver's seat and the shift control is located to the right of the driver's seat. These controls are connected to the power plant by means of levers and linkages that are, for the most part, located in the power plant compartment. Refer to TM 9-2300-216-20 for a more complete description of the controls and linkages.

h. Hydraulic System. The hydraulic system is roughly divided into hull components and turret components. It is a closed system with power supplied by a mechanical pump driven by the engine and an electrical motor pump mounted on the turret. The hull hydraulic system consists of a vane-type pump, eight or ten suspension lockout cylinders, two spade cylinders, filter, and associated plumbing and controls. The turret hydraulic system consists of hydraulic components for operation of the cannon, loader and rammer, elevating system and traversing system. Refer to TM 9-2300-216-34-2 for description of the turret hydraulic system. Refer to TM 9-2300-216-20 for a more complete description of the hydraulic system.

i. Hull and Miscellaneous Parts. The vehicle hull, turret and spade are welded steel structures. Most of the covers and access plates on the hull are steel. The cupola cover above the driver's compartment is armored plate steel. Certain other covers, such as the engine deck, transmission deck and battery compartment cover are nonballistic type aluminum alloy plate. An adjustable seat is located in the driver's compartment and a foldable bench type seat is mounted on the right rear of the vehicle. Various stowage boxes, brackets, and straps are installed on and in the hull and spade.

1-5. Differences Between Models

Differences in the hull portion of the M107 vehicles or the M110/M110A1 vehicles occur between older and newer vehicles and are noted by a code in the repair chapters. Also, M107 vehicles serial number 734 and subsequent and M110 vehicles serial number 996 and subsequent are provided with product improvements for the auxiliary drive magnetic clutch, traversing final drive, traversing planet carrier, driver's hatch latch, intercom box step, aeration detector, throttle yield link, fuel prime and purge, master relay, voltage regulator, idler arm adjustment, fabric fuel cells, elevating and traversing control handles, elevating and traversing system, rammer and loader, rammer and spade valves, projectile tray, gun retract valve, spade tube guard, wedge travel lock, spade controls, and deck mount. The following codes are used in this manual to identify these differences:

Code A

M107	serial numbers 1 through 733
M110/M110A1	serial numbers 1 through 995
M110A1	serial numbers 1-1 through 733-1

Code B

M107	serial numbers 734 and subsequent
M110/M110A1	serial numbers 996 and subsequent
M110A1	serial numbers 734-1 and subsequent

The M107 vehicle serial numbers 1 through 733 and M110/M110A1 vehicle serial numbers 1 through 995 and M110A1 vehicle serial numbers 1-1 through 733-1 may be modified with product improvements to the "B" vehicle configuration. Refer to vehicle log book for modifications to your vehicle. The vehicle serial number is stamped on the vehicle service data (identification) in driver's compartment. Components without codes are common to all vehicles.

CHAPTER 2

PARTS, SPECIAL TOOLS, AND EQUIPMENT FOR DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE

2-1. General

Tools, equipment, and maintenance parts over and above those available to the using organization are supplied to direct support and general support maintenance units for maintaining and repairing the materiel.

2-2. Parts

Maintenance parts are listed in TM 9-2300-216-34P-1, which is the authority for requisitioning replacements.

2-3. Common Tools and Equipment

Standard and commonly used tools and equipment having general application to this materiel are authorized for issue by tables of allowances and tables of organization and equipment.

2-4. Special Tools and Equipment (Fig. 2-1)

The special tools and equipment, listed in table 2-1 and illustrated in figure 2-1, are the only special tools and equipment necessary to perform the maintenance operations described in this technical manual. Refer to TM 9-2300-216-34P-1 for special tools and equipment allocations and requisitioning authority.

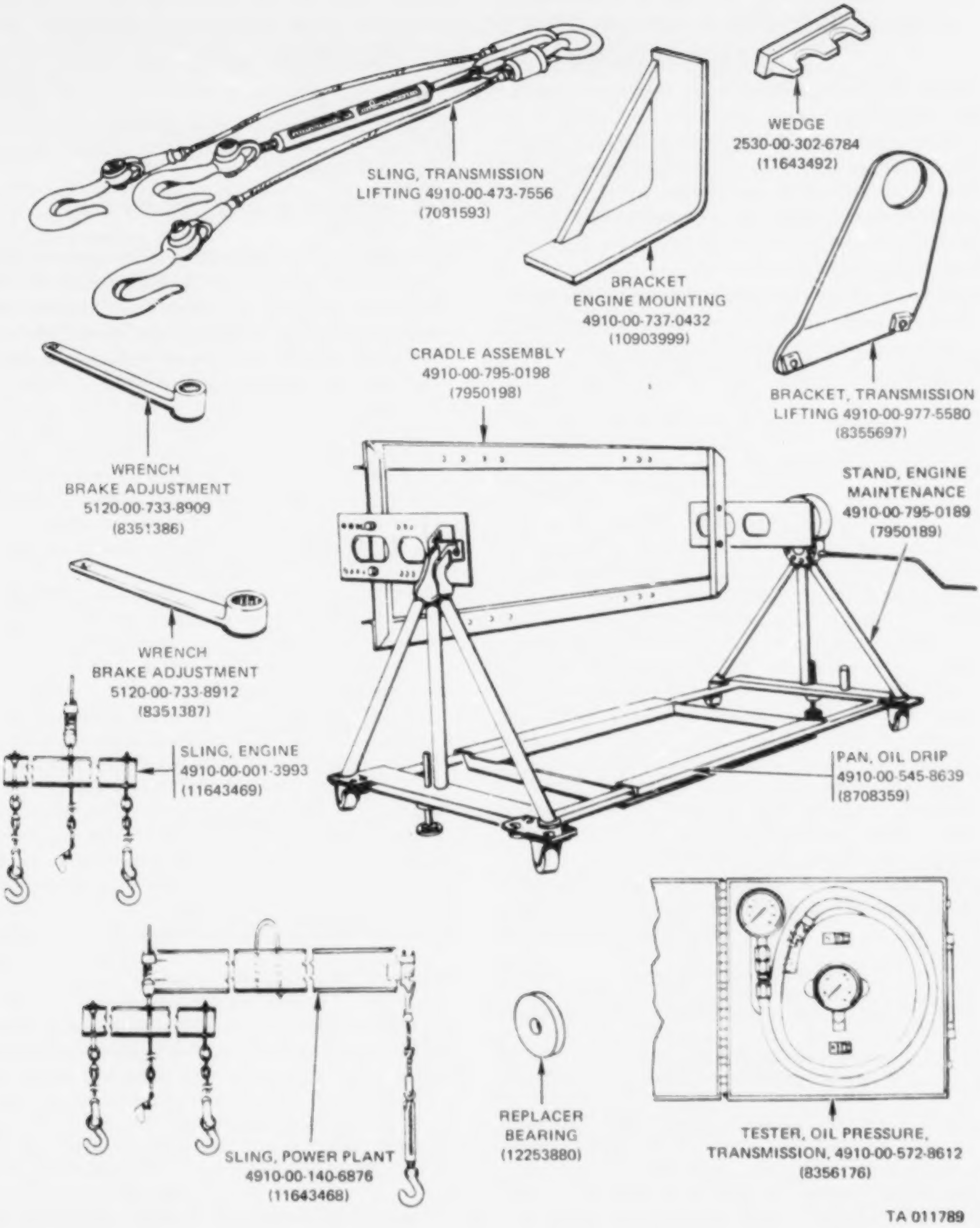

SLING, TRANSMISSION
LIFTING 4910-00-473-7556
(7081593)
BRACKET
ENGINE MOUNTING
4910-00-737-0432
(10903999)
WEDGE
2530-00-302-6784
(11643492)
BRACKET, TRANSMISSION
LIFTING 4910-00-977-5580
(8355697)
CRADLE ASSEMBLY
4910-00-795-0198
(7950198)
WRENCH
BRAKE ADJUSTMENT
5120-00-733-8909
(8351386)
STAND, ENGINE
MAINTENANCE
4910-00-795-0189
(7950189)
WRENCH
BRAKE ADJUSTMENT
5120-00-733-8912
(8351387)
SLING, ENGINE
4910-00-001-3993
(11643469)
PAN, OIL DRIP
4910-00-545-8639
(8708359)
SLING, POWER PLANT
4910-00-140-6876
(11643468)
REPLACER
BEARING
(12253880)
TESTER, OIL PRESSURE,
TRANSMISSION, 4910-00-572-8612
(8356176)
TA 011789

Figure 2-1. Special tools and equipment for direct support and general support maintenance (sheet 1 of 5).

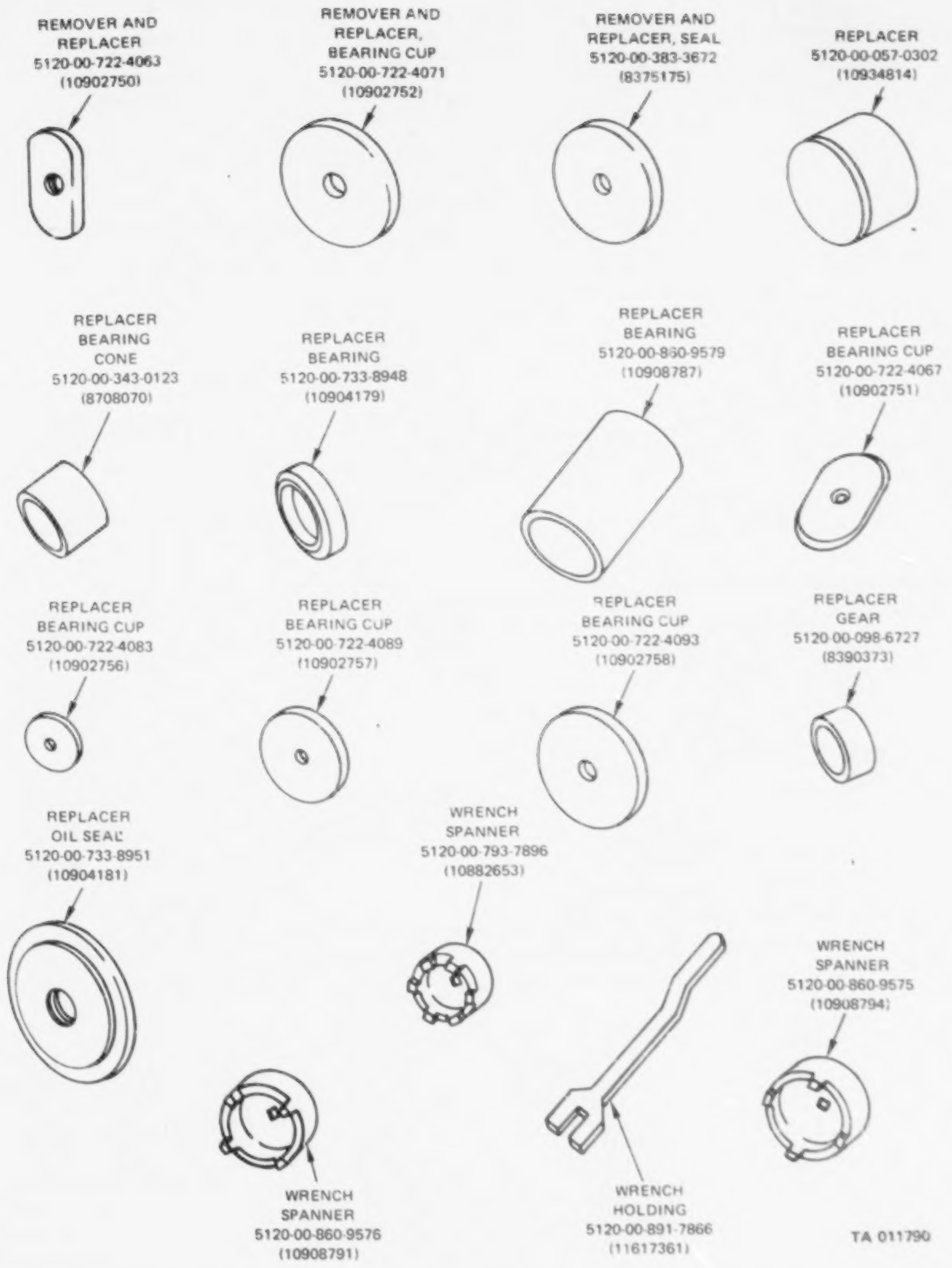

REMOVER AND REPLACER 5120-00-722-4063 (10902750)
REMOVER AND REPLACER, BEARING CUP 5120-00-722-4071 (10902752)
REMOVER AND REPLACER, SEAL 5120-00-383-3672 (8375175)
REPLACER 5120-00-057-0302 (10934814)
REPLACER BEARING CONE 5120-00-343-0123 (8708070)
REPLACER BEARING 5120-00-733-8948 (10904179)
REPLACER BEARING 5120-00-860-9579 (10908787)
REPLACER BEARING CUP 5120-00-722-4067 (10902751)
REPLACER BEARING CUP 5120-00-722-4083 (10902756)
REPLACER BEARING CUP 5120-00-722-4089 (10902757)
REPLACER BEARING CUP 5120-00-722-4093 (10902758)
REPLACER GEAR 5120-00-098-6727 (8390373)
REPLACER OIL SEAL 5120-00-733-8951 (10904181)
WRENCH SPANNER 5120-00-793-7896 (10882653)
WRENCH SPANNER 5120-00-860-9575 (10908794)
WRENCH SPANNER 5120-00-860-9576 (10908791)
WRENCH HOLDING 5120-00-891-7866 (11617361)
TA 011790

Figure 2-1. Special tools and equipment for direct support and general support maintenance (sheet 2 of 5).

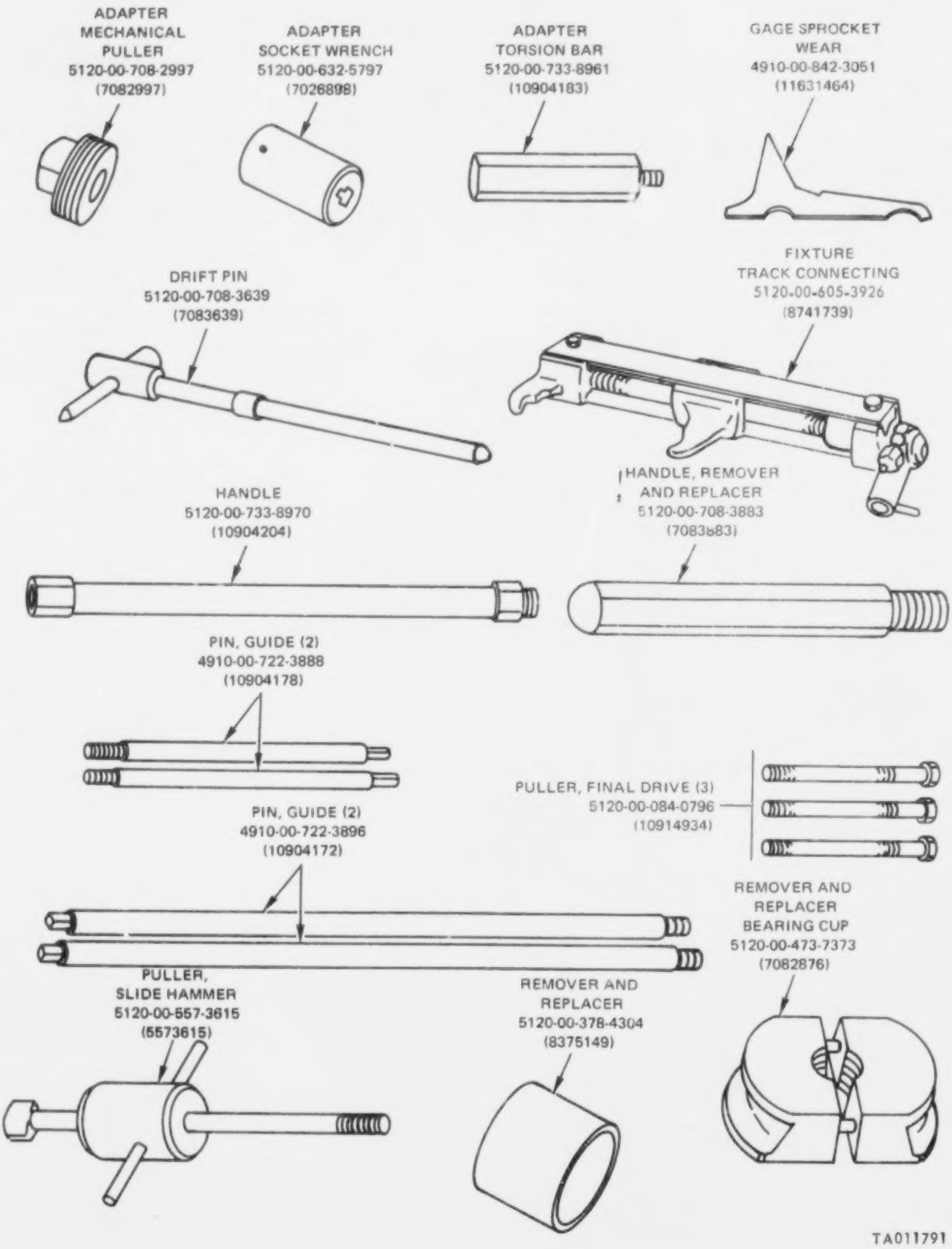

ADAPTER
MECHANICAL
PULLER
5120-00-708-2997
(7082997)
ADAPTER
SOCKET WRENCH
5120-00-632-5797
(7026898)
ADAPTER
TORSION BAR
5120-00-733-8961
(10904183)
GAGE SPROCKET
WEAR
4910-00-842-3051
(11631464)
DRIFT PIN
5120-00-708-3639
(7083639)
FIXTURE
TRACK CONNECTING
5120-00-605-3926
(8741739)
HANDLE
5120-00-733-8970
(10904204)
HANDLE, REMOVER
AND REPLACER
5120-00-708-3883
(7083883)
PIN, GUIDE (2)
4910-00-722-3888
(10904178)
PULLER, FINAL DRIVE (3)
5120-00-084-0796
(10914934)
PIN, GUIDE (2)
4910-00-722-3896
(10904172)
REMOVER AND
REPLACER
BEARING CUP
5120-00-473-7373
(7082876)
PULLER,
SLIDE HAMMER
5120-00-557-3615
(5573615)
REMOVER AND
REPLACER
5120-00-378-4304
(8375149)
TA011791

Figure 2-1. Special tools and equipment for direct support and general support maintenance (sheet 3 of 5).

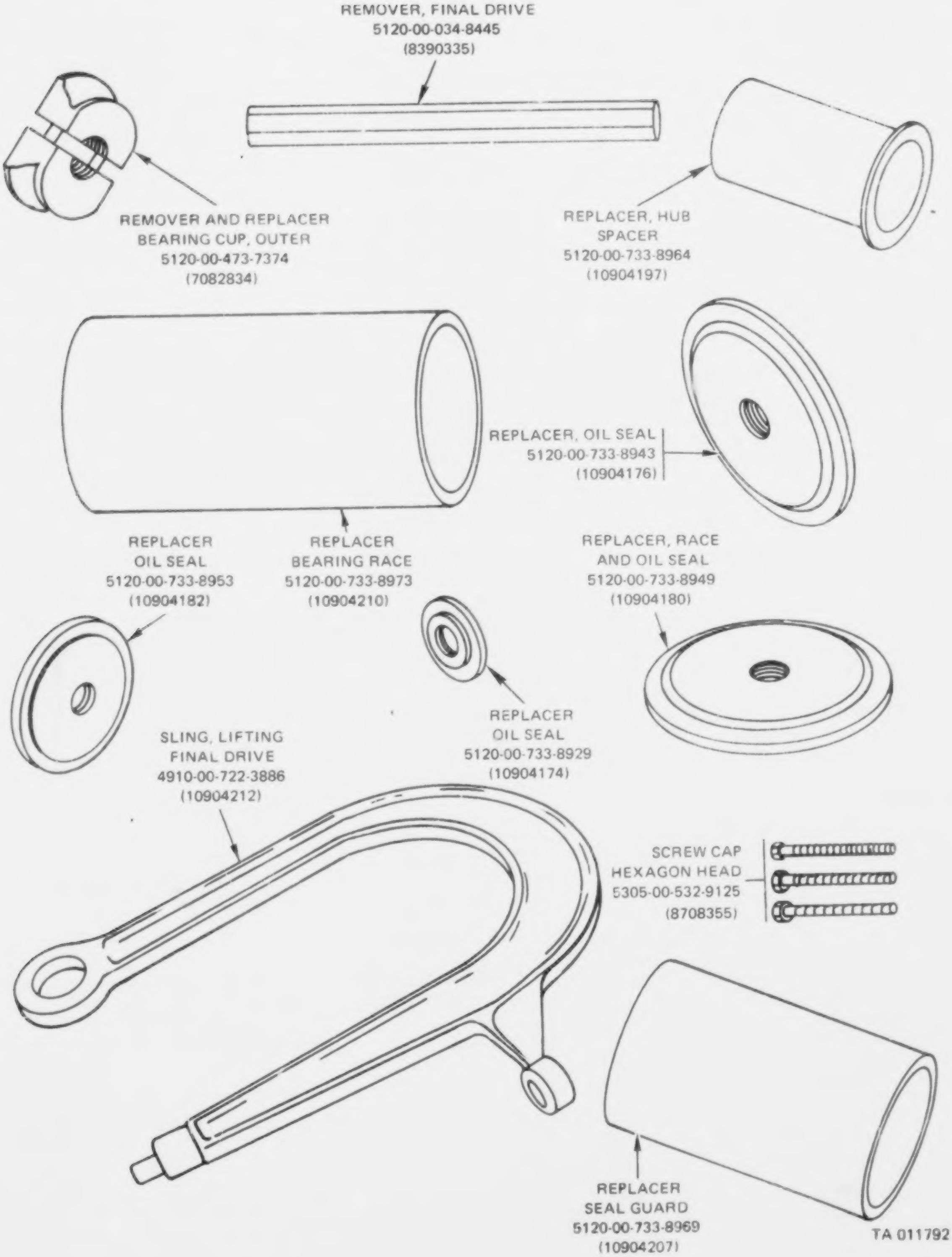

REMOVER, FINAL DRIVE
5120-00-034-8445
(8390335)
REMOVER AND REPLACER
BEARING CUP, OUTER
5120-00-473-7374
(7082834)
REPLACER, HUB
SPACER
5120-00-733-8964
(10904197)
REPLACER, OIL SEAL
5120-00-733-8943
(10904176)
REPLACER
OIL SEAL
5120-00-733-8953
(10904182)
REPLACER
BEARING RACE
5120-00-733-8973
(10904210)
REPLACER, RACE
AND OIL SEAL
5120-00-733-8949
(10904180)
REPLACER
OIL SEAL
5120-00-733-8929
(10904174)
SLING, LIFTING
FINAL DRIVE
4910-00-722-3886
(10904212)
SCREW CAP
HEXAGON HEAD
5305-00-532-9125
(8708355)
REPLACER
SEAL GUARD
5120-00-733-8969
(10904207)
TA 011792

Figure 2-1. Special tools and equipment for direct support and general support maintenance (sheet 4 of 5).

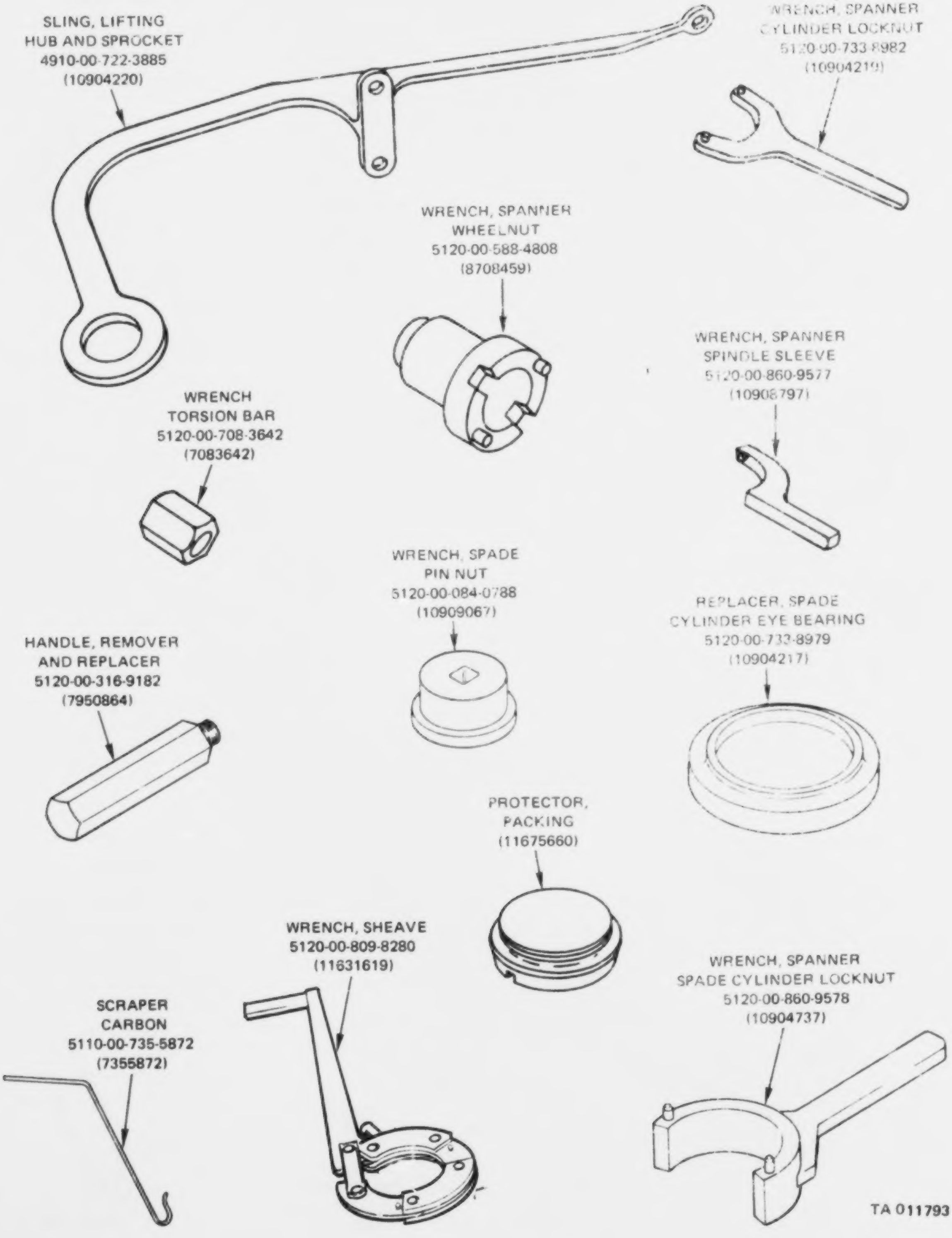

SLING, LIFTING
HUB AND SPROCKET
4910-00-722-3885
(10904220)
WRENCH, SPANNER
CYLINDER LOCKNUT
5120-00-733-8982
(10904219)
WRENCH, SPANNER
WHEELNUT
5120-00-588-4808
(8708459)
WRENCH, SPANNER
SPINDLE SLEEVE
5120-00-860-9577
(10908797)
WRENCH
TORSION BAR
5120-00-708-3642
(7083642)
WRENCH, SPADE
PIN NUT
5120-00-084-0788
(10909067)
REPLACER, SPADE
CYLINDER EYE BEARING
5120-00-733-8979
(10904217)
HANDLE, REMOVER
AND REPLACER
5120-00-316-9182
(7950864)
PROTECTOR,
PACKING
(11675660)
WRENCH, SHEAVE
5120-00-809-8280
(11631619)
WRENCH, SPANNER
SPADE CYLINDER LOCKNUT
5120-00-860-9578
(10904737)
SCRAPER
CARBON
5110-00-735-5872
(7355872)
TA 011793

Figure 2-1. Special tools and equipment for direct support and general support maintenance (sheet 5 of 5).

Table 2-1. Special Tools and Equipment for Direct Support and General Support Maintenance

Item	Identifying number	References		Use
		Fig.	Para.	
ADAPTER, MECHANICAL PULLER	5120-00-708-2997 (7082997)	2-1 Sh3	4-71	Used with slide hammer type puller to remove road wheel arm.
ADAPTER, SOCKET WRENCH	5120-00-632-5797 (7026898)	2-1 Sh3	4-89	Used with track connecting fixture to connect track.
ADAPTER, TORSION BAR	5120-00-733-8961 (10904183)	2-1 Sh3	4-69	Used with slide hammer type puller to remove torsion bar.
BRACKET, ENGINE MOUNTING	4910-00-737-0432 (10903999)	2-1 Sh1	5-4*q*	Used with cradle and stand to mount engine for maintenance.
BRACKET, TRANSMISSION LIFTING	4910-00-977-5580 (8355697)	2-1 Sh1	5-4*n*	Used with lifting sling to lift transmission.
CRADLE ASSEMBLY	4910-00-795-0198 (7950198)	2-1 Sh1	5-4*q*	Used with bracket and stand to mount engine for maintenance.
DRIFT PIN	5120-00-708-3639 (7083639)	2-1 Sh3	4-64	Track pin removal.
FIXTURE, TRACK CONNECTING, FULL TRACKED VEHICLE	5120-00-605-3926 (8741739)	2-1 Sh3	4-64 4-89	Used with socket wrench adapter to connect track.
GAGE SPROCKET WEAR	4910-00-842-3051 (11631464)	2-1 Sh3	16-4	Gage sprocket wear.
HANDLE	5120-00-733-8970 (10904204)	2-1 Sh3	16-8	Used with oil seal replacer to replace trailing idler upper spindle inner oil seal.
HANDLE, REMOVER AND REPLACER	5120-00-708-3883 (7083883)	2-1 Sh3	16-7 16-8	Used with four bearing, race, or seal remover replacers in suspension system maintenance.
HANDLE, REMOVER AND REPLACER	5120-00-316-9182 (7950864)	2-1 Sh5	5-39*l* 5-39*q* 5-43*b* 5-43*n*	Used with bearing cup replacer to remove power take-off cover seals.
PAN, DRIP, OIL	4930-00-545-8639 (8708359)	2-1 Sh1	5-4*q*	Used on engine stand to catch engine oil spillage.
PIN, GUIDE (2)	4910-00-722-3888 (10904178)	2-1 Sh3	4-71 4-81	Guide road wheel arm to hull.
PIN, GUIDE (2)	4910-00-722-3896 (10904172)	2-1 Sh3	4-66 4-86	Guide final drive to hull.
PULLER, FINAL DRIVE (3)	5305-00-084-0796 (10914934)	2-1 Sh3	4-66	Remove final drive.
PROTECTOR, PACKING, SPADE CYLINDER ROD	No NSN (11675660)	2-1 Sh5	13-4*a*(12)	Used on spade cylinder piston to protect cylinder head packing.
PULLER, SLIDE HAMMER TYPE	5120-00-557-3615 (5573615)	2-1 Sh3	4-68 4-71	Used with two adapters to remove road wheel arm or torsion bar.
REMOVER AND REPLACER	5120-00-722-4063 (10902750)	2-1 Sh2	5-43*n*	Remove and replace auxiliary drive shaft housing seals and power take-off idler gear bearings.
REMOVER AND REPLACER	5120-00-378-4304 (8375149)	2-1 Sh3	16-8	Remove and replace trailing idler upper spindle inner bearing inner race.
REMOVER AND REPLACER, BEARING	5120-00-722-4071 (10902752)	2-1 Sh2	6-40	Remove and replace auxiliary drive shaft carrier housing bearing and seals. Used with handle 5120-00-316-9182.
REMOVER AND REPLACER, BEARING CUP, INNER	5120-00-473-7373 (7082876)	2-1 Sh3	16-7 16-8	Used with remover and replacer handle to remove and replace road wheel hub inner bearing cup and compensating idler wheel hub inner bearing cup.
REMOVER AND REPLACER, BEARING CUT, OUTER	5120-00-473-7374 (7082834)	2-1 Sh4	16-7 16-8	Used with remover and replacer handle to remove and replace road wheel hub bearing cup and trailing idler wheel hub outer bearing cup.
REMOVER AND REPLACER, SEAL	5120-00-383-3672 (8375175)	2-1 Sh2	6-15*a*	Remove and replace auxiliary drive mounting flange housing outer seal, used with handle 5120-00-316-9182.
REMOVER, FINAL DRIVE	5120-00-034-8445 (8390335)	2-1 Sh4	4-66	Remove final drive tapered pins.
REPLACER	5120-00-057-0302 (10934814)	2-1 Sh2	6-34*j*	Replace auxiliary drive shaft bearing cones.

Table 2-1. Special Tools and Equipment for Direct Support and General Support Maintenance — Continued

Item	Identifying number	References		Use
		Fig.	Para.	
REPLACER, ASSEMBLY, BEARING CONE	5120-00-343-0123 (8708070)	2-1 Sh2	5-43*c*	Replace auxiliary drive mounting flange housing outer bearing and power take-off output gear cover bearing.
REPLACER, BEARING	5120-00-733-8948 (10904179)	2-1 Sh2	6-15*b* 14-8*a*	Replace auxiliary drive clutch housing inner bearing and lockout cylinder bearings.
REPLACER, BEARING	5120-00-860-9579 (10908787)	2-1 Sh2	5-43*d* 6-28*a* 6-34*c*	Replace auxiliary drive gear inner bearing cones and power take-off output gear bearing.
REPLACER, BEARING "B" VEHICLES	No NSN (12253880)	2-1 Sh1	6-16*e*	Replace auxiliary drive magnetic clutch housing bearings.
REPLACER, BEARING CUP	5120-00-722-4067 (10902751)	2-1 Sh2	6-34*b*	Replace auxiliary drive gear housing outer bearing cap used with handle 5120-00-316-9182.
REPLACER, BEARING CUP	5120-00-722-4083 (10902756)	2-1 Sh2	6-34*k* 6-34*ac* 6-40*c*	Replace auxiliary drive shaft carrier bearing cups and outer carrier seal used with handle 5120-00-316-9182.
REPLACER, BEARING CUP	5120-00-722-4089 (10902757)	2-1 Sh2	13-4*a*(13) 5-39*l* 5-43*g*	Replace spade cylinder head seals. Replace power take-off cover seals and spade cylinder head seal. Used with handle 5120-00-316-9182.
REPLACER, BEARING CUP	5120-00-722-4093 (10902758)	2-1 Sh2	5-39*q* 5-43*b* 6-28*b* 6-28*c* 6-34*a*	Replace auxiliary drive gear housing inner bearing cup, auxiliary drive gear case outer bearing cup, and power take-off gear case seal used with handle 5120-00-316-9182.
REPLACER, BEARING RACE	5120-00-733-8973 (10904210)	2-1 Sh4	16-8	Replace trailing idler upper spindle outer bearing inner race.
REPLACER, EYE BEARING	5120-00-383-3672 (8375175)	2-1 Sh2	6-15*a*	Remove and replace auxiliary drive mounting flange housing outer seal, used with handle 5120-00-316-9182.
REPLACER, GEAR	5120-00-098-6727 (8390373)	2-1 Sh2	6-22*a*	Replace auxiliary drive bearing unit flange bearings.
REPLACER, HUB SPACER	5120-00-733-8964 (10904197)	2-1 Sh4	16-7	Replace road wheel hub spacer.
REPLACER, OIL SEAL	5120-00-733-8943 (10904176)	2-1 Sh4	16-7	Replace road wheel arm upper spindle oil seal in retainer used with handle 5120-00-703-3883.
REPLACER, OIL SEAL	5120-00-733-8951 (10904181)	2-1 Sh2	6-15*f* 16-7 16-8 6-15*d*	Used to replace trailing idler upper spindle inner oil seals, inner bearing outer race, road wheel arm upper spindle inner oil seal. Also auxiliary drive clutch housing inner seal ("A" vehicles). Used with handles 5120-00-708-3883 and 5120-00-733-8970.
REPLACER, OIL SEAL	5120-00-733-8953 (10904182)	2-1 Sh4	16-8	Replace trailing idler upper spindle outer oil seal used with handle 5120-00-708-3883.
REPLACER, OIL SEAL	5120-00-733-8929 (10904174)	2-1 Sh4	14-8*h*	Replace lockout cylinder head seal used with handle 5120-00-708-3883.
REPLACER, RACE AND OIL SEAL	5120-00-733-8949 (10904180)	2-1 Sh4	16-8	Used with remover and replacer handle to replace trailing idler upper spindle housing outer bearing outer race and oil seal used with handle 5120-00-708-3883.
REPLACER, SEAL GUARD	5120-00-733-8969 (10904207)	2-1 Sh4	16-7	Replace road wheel arm seal guard.
SCRAPER, CARBON	5110-00-735-5872 (7355872)	2-1 Sh5	23-31*g*(2)(e)	Scrape carbon from heater ignitor housing.
SCREW, CAP, HEXAGON	5305-00-532-9125 (8708355)	2-1 Sh4	4-70 4-71	Remove road wheel arm and trailing idler arm.
SLING, TRANSMISSION LIFTING	4910-00-473-7556 (7081593)	2-1 Sh1	5-4*n*	Lift transmission.

Table 2-1. Special Tools and Equipment for Direct Support and General Support Maintenance — Continued

Item	Identifying number	References		Use
		Fig	Para	
SLING, LIFTING, FINAL DRIVE	4910-00-722-3886 (10904212)	2-1 Sh4	4-66	Lift final drive.
SLING, LIFTING, HUB AND SPROCKET	4910-00-722-3885 (10904220)	2-1 Sh5	4-65	Lift hub and sprocket.
SLING, POWER PLANT	4910-00-140-6876 (11643468)	2-1 Sh1	4-12	Lift power plant.
SLING, ENGINE	4910-00-001-3993 (11643469)	2-1 Sh1	5-4*n*	Lift engine.
STAND, ENGINE MAINTENANCE	4910-00-795-0189 (7950189)	2-1 Sh1	5-4*n*	Used with cradle and bracket to mount engine for maintenance.
TESTER, OIL PRESSURE	4910-00-572-8612 (8356176)	2-1 Sh1	Table 3-1	Check oil pressure.
WEDGE, TRAILING IDLER	2530-00-302-6784 (11643492)	2-1 Sh1	16-8	Used to remove, install and adjust trailing idler arm.
WRENCH, HOLDING	5120-00-891-7866 (11617361)	2-1 Sh2	4-12	Hold power take-off.
WRENCH, SHEAVE	5120-00-809-8280 (11631619)	2-1 Sh5	4-22	To hold fan sheaves.
WRENCH, SPADE PIN NUT	5120-00-084-0788 (10909067)	2-1 Sh5	4-5	Hold spade pin nut.
WRENCH, SPANNER CYLINDER LOCKNUT	5120-00-733-8982 (10904219)	2-1 Sh5	14-4*d* 14-8*w* 14-8*ab*	Hold lockout cylinder lock nut.
WRENCH, SPANNER	5120-00-860-9575 (10908794)	2-1 Sh2	6-28*g* 6-30*t* 6-34*g*	Turn auxiliary drive gear bearing locknut.
WRENCH, SPANNER	5120-00-860-9576 (10908791)	2-1 Sh2	7-6*b* 7-10*g*	Turn auxiliary drive bearing unit bearing lock nut.
WRENCH, SPANNER	5120-00-793-7896 (10882653)	2-1 Sh2	6-4*d*(1) 6-5*e*(3)	Turn magnetic clutch retaining nut.
WRENCH, SPANNER WHEEL NUT	5120-00-588-4808 (8708459)	2-1 Sh5	16-7 16-8	Turn road wheel bearing adjusting nut and trailing idler wheel bearing adjusting nut.
WRENCH, SPANNER SPINDLE SLEEVE	5120-00-860-9577 (10908797)	2-1 Sh5	16-8	Turn trailing idler upper spindle sleeve.
WRENCH, SPANNER	5120-00-860-9578 (10904737)	2-1 Sh5	13-4*a*	Turn spade cylinder head locknut.
WRENCH, SPLINED, BRAKE ADJUSTMENT	5120-00-733-8909 (8351386)	2-1 Sh1	5-79	Check right brake adjustment.
WRENCH, SPLINED, BRAKE ADJUSTMENT	5120-00-733-8912 (8351387)	2-1 Sh1	5-79	Check left brake adjustment.
WRENCH, TORSION BAR RETAINING NUT	5120-00-708-3642 (7083642)	2-1 Sh5	4-68	Turn torsion bar plug.

2-5. Improvised Tools

(Fig. 2-2, 2-3 and 2-4).

The improvised tools illustrated with pertinent data for fabrication in figures 2-2, 2-3 and 2-4, permit local fabrication of tools if desired. These tools are of chief value to maintenance organizations engaged in repairing a large number of identical components; however, they are not essential and are not available for issue. The following data are furnished for information only.

a. The improvised tool shown in figure 2-2 is a wrench adapter used with a standard socket wrench and torque wrench during assembly of the suspension lockout cylinder, as illustrated in figure 14-1.

b. The improvised tool shown in figure 2-3 is a torque wrench extension used with a standard 400 lb ft scale torque wrench that enables maintenance personnel to increase the torque wrench range to obtain the torque required for the trailing idler eccentric bolts during track tension adjustment (1,000-1,200 lb ft, "A" vehicles and 600 ± 25 lb ft, "B" vehicles).

c. The improvised tool shown in figure 2-4 is a bearing remover used with an arbor press during assembly or disassembly of the magnetic clutch on the "A" vehicles.

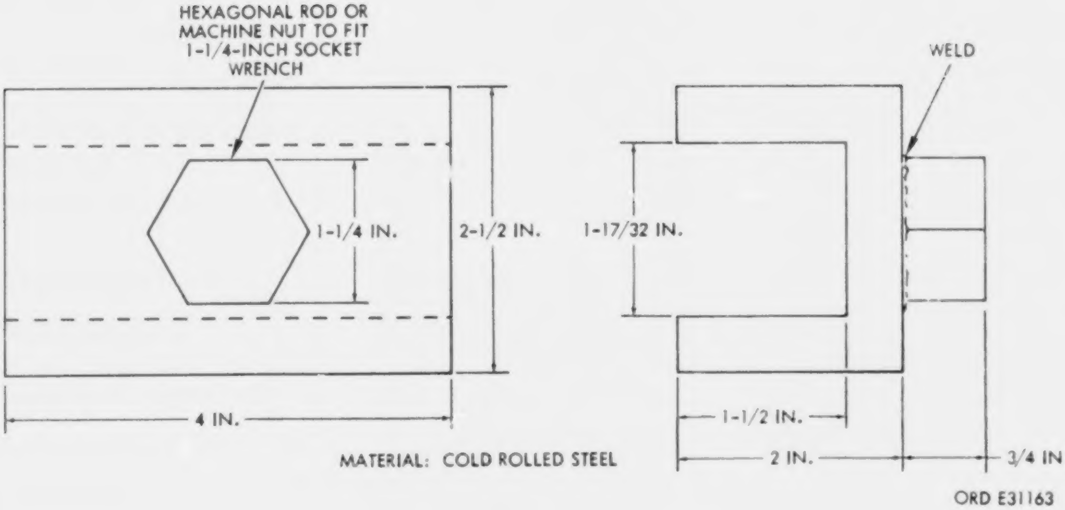
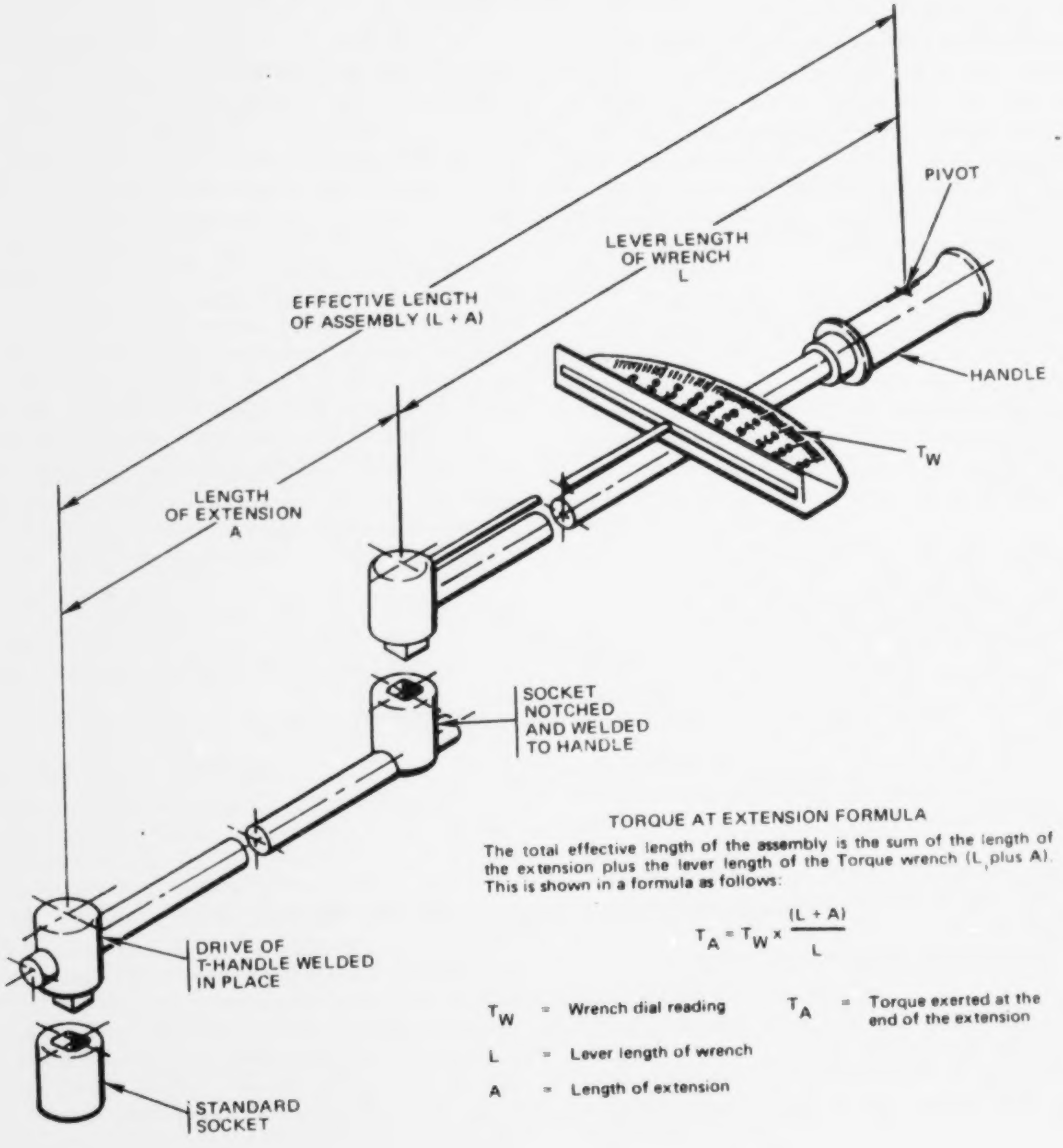

HEXAGONAL ROD OR MACHINE NUT TO FIT 1-1/4-INCH SOCKET WRENCH
WELD
1-1/4 IN.
2-1/2 IN.
1-17/32 IN.
4 IN.
1-1/2 IN.
2 IN.
3/4 IN
MATERIAL: COLD ROLLED STEEL
ORD E31163

Figure 2-2. Lockout cylinder adapter.


PIVOT
LEVER LENGTH OF WRENCH L
EFFECTIVE LENGTH OF ASSEMBLY (L + A)
HANDLE
T_W
LENGTH OF EXTENSION A
SOCKET NOTCHED AND WELDED TO HANDLE
DRIVE OF T-HANDLE WELDED IN PLACE
STANDARD SOCKET

TORQUE AT EXTENSION FORMULA

The total effective length of the assembly is the sum of the length of the extension plus the lever length of the Torque wrench (L plus A). This is shown in a formula as follows:

$$T_A = T_W \times \frac{(L + A)}{L}$$

T_W = Wrench dial reading

T_A = Torque exerted at the end of the extension

L = Lever length of wrench

A = Length of extension

AT 46298

Figure 2-3. Torque wrench extension.

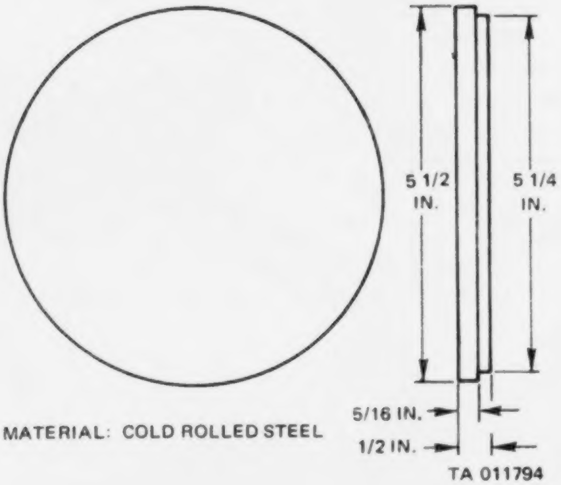

5 1/2 IN.
5 1/4 IN.
5/16 IN.
1/2 IN.
MATERIAL: COLD ROLLED STEEL
TA 011794

Figure 2-4. Magnetic clutch bearing remover ("A" vehicles).

CHAPTER 3
TROUBLESHOOTING

Section I. GENERAL

3-1. Purpose

Information in this chapter is for use of direct support and general support maintenance personnel in conjunction with, and as a supplement to, the troubleshooting section in TM 9-2300-216-20. It provides continuation of instructions where a remedy in the organization technical manual refers to supporting maintenance personnel for corrective action.

Operation of a deadlined vehicle without a preliminary examination can cause further damage to a disabled component and possible injury to personnel. By careful inspection and troubleshooting, such damage and injury can be avoided and, in addition, the causes of faulty operation of a vehicle or component can often be determined without extensive disassembly.

3-2. General Instructions and Procedures

This chapter contains inspection and troubleshooting procedures to be performed while a disabled component is still mounted in the vehicle and after it has been removed.

a. The inspections made while the component is mounted in the vehicle are for the most part visual and are to be performed before attempting to operate the vehicle. The object of these inspections is to determine the condition of the component, and if found defective, to take precautions to prevent further damage to it.

b. The troubleshooting performed while the component is mounted in the vehicle is that which is beyond the normal scope of the using organization. Check the vehicle troubleshooting and electrical troubleshooting sections of TM 9-2300-216-20, then proceed as outlined in this chapter.

c. Inspection after the component is removed from the vehicle is performed to verify the diagnosis made when the component was in the vehicle, to uncover further defects, or to determine malfunctions if the component alone is received by the supporting maintenance. This inspection is particularly important in the last case because it is often the only means of determining the malfunction without completely disassembling the component.

d. Troubleshooting a disabled component after it has been removed from the vehicle consists of manual operation of the component or subjecting it to tests whenever test equipment is available and test procedures have been established.

Section II. TROUBLESHOOTING PROCEDURES

3-3. General Procedures

a. General. Do not operate any power actuated components in the vehicle before completing the procedures below. Careful manual operation, where applicable, may be performed to determine normal or abnormal functioning where indicated in the procedures.

b. Inspect Appearance. The appearance of a component or assembly will indicate its general condition and will reflect the type of treatment it has received. Examine for dents or cracked surfaces, bent or broken tubes or parts, fungus growth, moisture, corrosion, dirt or other foreign matter, excessive wear, oil stains, bare wire, worn insulation, tampering, and other evidence of misuse that might indicate the source of trouble and the need for repair.

c. Inspect Completeness. Check to see that all components are present and properly mounted. Secure or replace as required.

d. Inspect Modifications. Be certain that all authorized and required modifications have been incorporated in accordance with DA Form 2408-5 and check for the presence of unauthorized modifications.

3-4. Detailed Procedures.

Upon completion of the general troubleshooting procedures (para 3-3 above), perform the specific procedures described in Table 3-1. For all troubleshooting procedures pertaining to the turret, refer to TM 9-2300-216-34-2.

Table 3-1. Troubleshooting

MALFUNCTION
    TEST OR INSPECTION
        CORRECTIVE ACTION

ENGINE

1. STARTER FAILS TO CRANK ENGINE WHEN START SWITCH IS DEPRESSED.

Step 1. Put transmission shift lever in N (neutral position).
Turn MASTER switch to ON.
Turn INSTrument switch to ON.
Panel light and master switch indicator light will light. If not, troubleshoot battery power and master relay circuits (TM 9-2300-216-20).

Table 3-1. Troubleshooting — Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ENGINE — Continued

1. STARTER FAILS TO CRANK ENGINE WHEN START SWITCH IS DEPRESSED — Continued

Step 2. Check battery electrolyte for battery charge. Open battery access door and remove cover.
If battery charge is low, recharge batteries (TM 9-6140-200-12) or replace batteries (TM 9-2300-216-20). Install cover and close battery access door.

Step 3. Remove engine deck.
Check adjustment and operation of neutral position switch.
Adjust or replace neutral position switch (TM 9-2300-216-20) and install engine deck.

Step 4. Check Starter.
Depress start switch.
a. Listen for sound of starter engaging engine. If starter does not engage engine, troubleshoot starting circuit and starter (TM 9-2300-216-20).
b. If starter engages but does not crank engine, check for hydrostatic lock or internal mechanical seizure of engine (TM 9-2815-202-34).

2. ENGINE CRANKS SLOWLY AND WILL NOT START.

Step 1. Check grade of oil in crankcase, if temperatures are below 40°F.
Check vehicle log book, DA Form 2404, Maintenance Record, for grade of oil used.
Drain and refill engine crankcase with correct grade of oil for temperature expected (LO 9-2300-216-12).

Step 2. Check battery electrolyte for battery charge.
Open battery access door and remove cover.
If battery charge is low, recharge batteries (TM 9-6140-200-12) or replace batteries (TM 9-2300-216-20). Install cover and close access door.

Step 3. Check for loose connections at battery terminals and ground connections.
Open battery access door and remove battery cover.
Tighten loose connections. Install battery cover and close access door.

Step 4. Check for loose starter connections.
Turn MASTER switch to OFF.
Remove engine deck.
Remove radiators (TM 9-2300-216-20).
Tighten loose starter connections. Install radiators and engine deck.

3. ENGINE CRANKS BUT FAILS TO START.

Step 1. Turn MASTER switch and INSTrument switch to ON.
Check fuel gage for fuel level.
Turn MASTER switch and INSTrument switch to OFF.
If gage reads empty or very low, fill fuel cell (TM 9-2300-216-10).

Step 2. Check that fuel shutoff handle is in correct position.
Push fuel shutoff handle in against hull.

Step 3. Attempt to start engine.
Hold PUMP AND IGNITER switch in MOMentary ON position while cycling FUEL VALVE switch ON and OFF for about 10 seconds while pressing start button.
Remove engine deck and feel air box heater, located on top of engine, to see if it is warm.
a. If air box heater is not warm, troubleshoot air box heater circuit (TM 9-2300-216-20).
b. If air box heater is warm, troubleshoot engine fuel system (TM 9-2815-202-34).

Step 4. Check for water in primary and secondary fuel filters.
Drain contaminate from fuel filters (TM 9-2300-216-10) or replace dirty filter (TM 9-2300-216-20).

Step 5. Check for faulty engine components.
Troubleshoot engine fuel system and for low engine compression (TM 9-2815-202-34).

4. ENGINE RUNS ABNORMALLY — ENGINE LABORS, RUNS UNEVENLY, HAS EXCESSIVE SMOKE, LACKS POWER, OR USES TOO MUCH OIL.

Step 1. Check engine for cause of abnormal operation.
Troubleshoot engine (TM 9-2815-202-34).

FUEL SYSTEM

5. INSUFFICIENT FUEL — FUEL CAP VENT CLOSED.

Step 1. Remove fuel filler cap.
Check filler cap vent valve position on inside of cap.
a. Turn vent valve to OPEN position. Fuel filler cap vent valve must be open for engine to receive fuel.
b. Install filler cap and tighten.

6. INSUFFICIENT FUEL — FUEL CELL EMPTY.

Step 1. Turn MASTER switch to ON.
Turn INSTrument switch to ON.
Read and record quantity of fuel shown by fuel level indicator.
Turn INSTrument switch and MASTER switch to OFF.
a. Fill fuel cell and record quantity of fuel added to fuel cell (Capacity: "A" vehicles 320 gal; "B" vehicles 260 gal.)

Table 3-1. Troubleshooting — Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

FUEL SYSTEM — Continued

6. INSUFFICIENT FUEL — FUEL CELL EMPTY — Continued

b. If the amount of fuel added does not agree approximately with the quantity recorded from fuel level indicator before filling fuel cell, proceed to step 2.

Step 2. Check fuel level indicator.

Compare quantity of fuel added to fuel cell to quantity of fuel shown by fuel level indicator before filling to determine accuracy of fuel level indicator.

a. If fuel level indicator did not show approximately correct fuel level, troubleshoot fuel level indicator, fuel liquid quantity transmitter and connecting electrical circuits (TM 9-2300-216-20).

b. On "B" vehicles, check that fuel liquid quantity transmitter float is not binding with fuel cell foam filler blocks. To check, remove and reinstall transmitter (TM 9-2300-216-20).

7. INSUFFICIENT FUEL AT ENGINE.

Step 1. Check for dirty low pressure fuel filter.

Replace filter element (TM 9-2300-216-20).

Step 2. Check for dirty high pressure fuel filter.

Replace filter element (TM 9-2300-216-20).

Step 3. Check for plugged fuel lines.

Provide one gallon container to catch fuel.

Disconnect fuel return line from engine.

Start engine and run for exactly one minute while second man collects fuel from disconnected fuel return line.

The amount of fuel collected should be 0.7 to 0.8 gal. If less than 0.5 gal is collected, remove, inspect, clean or replace and install fuel lines and fittings (TM 9-2300-216-20). Dispose of fuel in container.

Step 4. Check for defective engine fuel injectors.

Troubleshoot fuel injectors (TM 9-2815-202-34).

Step 5. Check for defective engine fuel pump.

Troubleshoot fuel pump (TM 9-2815-202-34).

8. FUEL LEAKS.

Step 1. Inspect fuel cell drain plug(s) for leakage. (One plug, "A" vehicles; two plugs, "B" vehicles).

a. Tighten leaking or loose drain plugs.

b. If tightening drain plugs does not stop leakage, drain fuel cell and replace plug(s) and packing(s).

(1) Provide suitable container(s) to catch fuel (Fuel capacity: "A" vehicles 320 gal; "B" vehicles 260 gal). Dispose of fuel.

(2) Position container(s) under fuel cell drain plug(s). Remove drain plug(s) and packing(s). Discard packing(s).

(3) Replace defective plug(s), provide new packing (s) and install in hull. Tighten securely.

(4) Fill fuel cell with 50 gallons fuel and check for drain plug leakage.

(5) If no leakage occurs, fill fuel cell to capacity. If leakage occurs, proceed to step 4*a* and step 4*b* below.

Step 2. Remove engine and transmission decks.

Inspect fuel supply and return lines and fittings for evidence of leaks.

Tighten loose connections. Replace defective hoses, tubes and fittings (TM 9-2300-216-20). Install engine and transmission decks.

Step 3. Check for internal leaks in fuel pump.

Troubleshoot fuel pump (TM 9-2815-202-34).

Step 4. Fill fuel cell.

Remove right side hull recess plate, fan well deck and engine deck.

Open battery access door.

Inspect exterior areas of hull fuel cell including under vehicle and in hull fan well for evidence of leaks.

a. On "A" vehicles, if evidence of hull fuel cell leak is found, repair hull (para 22-2). Install hull recess plate, fan well deck and engine deck. Close battery access door.

b. On "B" vehicles, if evidence of hull fuel cell leak is found, remove fabric fuel cell (para 4-74), repair hull (para 22-2) and repair fabric fuel cells (para 19-3). Install hull recess plate, fan well deck and engine deck. Close battery access door.

AIR INTAKE AND EXHAUST SYSTEM

9. INSUFFICIENT AIR.

Step 1. Remove and inspect air filter bags for excessive dirt or clogging (TM 9-2300-216-10).

If air filter bags are excessively dirty or clogged, clean air filter bags (TM 9-2300-216-10) or repair filter bags and baskets (TM 9-2300-216-20).

Step 2. Check air separator blowers.

Turn MASTER switch to ON.

Turn INSTrument switch to ON.

Check that forward and aft air blowers are operating by placing hand near forward and aft air blower exhaust ports to detect exhaust air.

Turn INSTrument switch and MASTER switch to OFF.

a. If either forward or aft air separator blower fails to operate, troubleshoot air cleaner blower circuits (TM 9-2300-216-20).

b. Repair defective forward or aft air separator blower (TM 9-2300-216-20).

Table 3-1. Troubleshooting — Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

AIR INTAKE AND EXHAUST SYSTEM — Continued

9. INSUFFICIENT AIR — Continued

Step 3. Remove and inspect forward and aft air separators for excessive dirt build-up (TM 9-2300-216-20).

Clean and repair forward and aft air separators (TM 9-2300-216-20).

Step 4. Remove intake air ducts and connectors (TM 9-2300-216-20).

Inspect hull tube for air restriction.

Remove any obstructing material from hull tube, clean with dry cleaning solvent (DCS-II) and dry.

Step 5. On "A" vehicles, inspect air intake adapter for air restriction and damage.

On "B" vehicles, inspect air intake screen assembly for air restriction and damage.

a. On "A" vehicles, remove any obstructing material from air intake adapter and clean with dry cleaning solvent (DCS-II). Replace damaged air intake adapter.

(1) Remove engine deck.
(2) Remove lock wire and four screws securing engine intake air adapter to turbocharger.
(3) Remove intake air adapter and gasket. Discard gasket.
(4) Install new gasket and serviceable intake air adapter and secure with four screws and lock wire. Install engine deck.

b. On "B" vehicles, remove and repair intake air screen assembly.

(1) Remove engine deck.
(2) Remove lock wire and four screws securing engine intake air screen assembly to turbocharger.
(3) Remove intake air screen assembly and gasket. Discard gasket.
(4) Repair intake air screen assembly (para 5-45).
(5) Install new gasket and serviceable intake air screen assembly and secure with four screws and lock wire. Install engine deck.

Step 6. Check turbocharger for foreign material lodged in compressor impeller or turbine and for rotating bearing seizure.

Troubleshoot turbocharger (TM 9-2815-202-34).

Step 7. Check turbocharger regulator for faulty bypass valve.

Troubleshoot turbocharger regulator (TM 9-2815-202-34).

10. BURNED AREAS ADJACENT TO EXHAUST MANIFOLD.

Step 1. Remove engine deck.

Check for loose exhaust manifold connections.

Tighten loose connections. Install engine deck.

Step 2. Remove engine deck.

Check for cracked exhaust manifold or damaged manifold gasket.

Replace damaged exhaust manifold or gasket.

(1) Remove five nuts and retainers securing exhaust manifold to cylinder head and remove exhaust manifold.
(2) Remove and discard exhaust manifold gasket.
(3) Position new gasket over exhaust outlets on cylinder head.

CAUTION

Aline exhaust manifold lugs correctly to prevent breakage.

(4) Install exhaust manifold to cylinder head and secure with five nuts and retainers. Install engine deck.

11. EXCESSIVE SMOKE.

Step 1. Check that engine shutdown handle is completely pushed in against hull.

Push engine shutdown handle completely in against hull.

Step 2. Remove engine deck.

Check that engine exhaust valve on end of exhaust valve is not stuck in closed position.

Replace engine exhaust valve that is stuck or does not work freely (TM 9-2300-216-20). Install engine deck.

Step 3. Check for engine air intake restriction.

Troubleshoot in accordance with MALFUNCTION 9 above.

Step 4. If smoke is white, check for engine misfiring or low cylinder compression.

If smoke is blue, check for engine oil bypassing cylinders.

If smoke is black or gray, check for wrong grade of fuel or defective fuel injectors.

Troubleshoot engine (TM 9-2815-202-34).

TRANSMISSION

12. OIL TEMPERATURE TOO HIGH (ABOVE 285°F).

Step 1. Check transmission oil level.

a. If oil level is low, add oil to proper level (LO 9-2300-216-12). Check for external oil leaks. Tighten loose plugs and screws. Replace defective gaskets (TM 9-2520-234-35).

b. If oil level is high, drain oil to proper level (LO 9-2300-216-12).

Step 2. Remove transmission deck.

Check for dirty or clogged transmission oil screen (Filter).

Remove and clean transmission oil screen (TM 9-2300-216-20). Install transmission deck.

Step 3. Check for defective transmission warning light, temperature indicator and electrical circuits.

Troubleshoot transmission warning light, temperature indicator and electrical circuits (TM 9-2300-216-20).

Table 3-1. Troubleshooting — Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

TRANSMISSION — Continued

12. OIL TEMPERATURE TOO HIGH (ABOVE 285°F) — Continued

Step 4. Check for low main oil pressure, defective oil pump, internal binding and clutch slippage.
Troubleshoot main transmission (TM 9-2520-234-35).

13. BRAKES DO NOT OPERATE PROPERLY.

Step 1. Check brake linkage for improper adjustment, wear and damage.
Adjust brake linkage and replace worn or damaged brake linkage components (TM 9-2300-216-20).

Step 2. Check transmission brakes for proper adjustment.
Adjust transmission brakes (TM 9-2300-216-20).

Step 3. Check right and left transmission brake hydraulic operating pressure (TM 9-2300-216-20).
If pressure is not correct, troubleshoot transmission oil pump (TM 9-2520-234-35).

Step 4. Check transmission for failed or worn brake plates.
Troubleshoot transmission brakes (TM 9-2520-234-35).

14. STEERING DOES NOT OPERATE PROPERLY.

Step 1. Check steering linkage for improper adjustment, wear and damage.
Adjust steering linkage and replace worn or damaged steering linkage components (TM 9-2300-216-20).

Step 2. Check right and left geared steer clutch and right and left output clutch hydraulic operating pressure (TM 9-2300-216-20).
If pressure is not correct, troubleshoot transmission oil pump (TM 9-2520-234-35).

Step 3. Check transmission internal steering.
Troubleshoot transmission internal steering (TM 9-2520-234-35).

15. TRANSMISSION DOES NOT SHIFT PROPERLY.

Step 1. Check transmission shift linkage for improper adjustment, wear and damage.
Adjust transmission shift linkage and replace worn or damaged components (TM 9-2300-216-20).

Step 2. Check transmission shift hydraulic pressure (TM 9-2300-216-20).
If pressure is not correct, troubleshoot oil pump (TM 9-2520-234-35).

Step 3. Check transmission internal shifting.
Troubleshoot transmission internal shifting (TM 9-2520-234-35).

16. TRANSMISSION OPERATES ABNORMALLY OR IMPROPERLY — STALLS, DOES NOT OPERATE IN ALL RANGES.

Step 1. Check all transmission hydraulic operating pressures (TM 9-2300-216-20).
If pressures are not correct, troubleshoot transmission oil pump (TM 9-2520-234-35).

Step 2. Check main transmission for clutch failure, internal oil leakage, defective valves and worn or damaged parts.
Troubleshoot main transmission (TM 9-2520-234-35).

POWER TAKE-OFF AND AUXILIARY DRIVE

17. EXCESSIVE NOISE FROM POWER TAKE-OFF OR AUXILIARY DRIVE.

Step 1. Check auxiliary drive oil level.
If oil level is low, add oil to FULL mark on bayonet gage (LO 9-2300-216-12).

Step 2. Check for play in drive shaft.
Remove engine compartment deck.
Remove hull recess cover plate on right side deck and enter right hand hull tunnel for access to drive shaft.
Rotate power take-off to auxiliary drive shaft back and forth by hand to check for play in drive shaft.
If any play is detected in drive line, remove drive shaft and repair universal joints (TM 9-2300-216-20). Install hull recess cover plate.

Step 3. Isolate excessive noise.
Remove right radiator (TM 9-2300-216-20).
Cap disconnected radiator hoses.
Fill left radiator with water.
Disconnect power take-off to auxiliary drive shaft at power take-off.
Start engine.
Determine if excessive noise is present in power take-off.
Stop engine.

a. If excessive noise was present, remove powerplant (TM 9-2300-216-20). Remove turbocharger and exhaust manifolds (para 5-6). Remove power take-off (para 5-5). Check power take-off for defective gears and bearings and repair (para 5-38). Install power take-off, exhaust manifolds, turbocharger and powerplant. Install right radiator and engine compartment deck.

b. If excessive noise was not present, remove auxiliary drive (TM 9-2300-216-20). Check for maladjustment or defective gears and bearings and repair input drive subassembly (para 6-35) and generator drive subassembly (para 6-29). Install auxiliary drive and right radiator. Install engine compartment deck.

18. EXCESSIVE NOISE FROM FAN OR MAGNETIC CLUTCH.

Step 1. Check for defective fan bearings and fan belts.
Remove fan well deck.
Check fan housing for evidence of impeller interference (scratches or gouges).
Check fan belts for wear, deterioration and damage.
Loosen fan belt tensioner to release all fan belt tension.
Push and pull impeller forward and back by hand and check for excessive play or looseness.

Table 3-1. Troubleshooting — Continued

MALFUNCTION
  TEST OR INSPECTION
    CORRECTIVE ACTION

POWER TAKE-OFF AND AUXILIARY DRIVE — Continued

18. EXCESSIVE NOISE FROM FAN OR MAGNETIC CLUTCH — Continued

a. If fan belts are damaged, replace all fan belts as a set. Install fan well deck.

b. If evidence of impeller interference is found or if impeller has excessive play, remove fan (TM 9-2300-216-20). Check fan for defective bearings and repair (para 8-9). Install fan and fan well deck.

Step 2. Remove fan well deck.
Check magnetic clutch oil level.

a. If oil level is low, add oil to bottom of level hole on "A" vehicles or to FULL mark of gage on "B" vehicles (LO 9-2300-216-12). Install fan well deck.

b. Lubricate magnetic clutch bearings (LO 9-2300-216-12). Install fan well deck.

c. Proceed to step 3.

Step 3. Start engine.
Determine if excessive noise is still present.
Stop engine.

If excessive noise was present, remove auxiliary drive (TM 9-2300-216-20). Remove magnetic clutch (para 6-4*d*). Check magnetic clutch for defective bearings and repair (para 6-9). Install magnetic clutch and auxiliary drive. Install fan well deck.

19. EXCESSIVE NOISE FROM CARRIER BEARING UNIT.

Step 1. Check for defective drive shaft and carrier bearing.
Remove fan well deck.
Disconnect magnetic clutch-to-carrier bearing drive shaft at magnetic clutch.
Remove hydraulic rotary pump (para 4-23).
Remove carrier bearing unit and drive shaft (TM 9-2300-216-20).

a. If any play is detected in drive shaft, repair universal joints (TM 9-2300-216-20). Install drive shaft and carrier bearing. Connect drive shaft to magnetic clutch. Install hydraulic rotary pump and fan well deck.

b. If no play is detected in drive line, check carrier bearing for defective bearings and repair (para 7-5). Install drive shaft and carrier bearing. Connect drive shaft to magnetic clutch. Install hydraulic rotary pump and fan well deck.

20. GENERATOR DOES NOT OPERATE.

Step 1. Check for defective generator voltage control assembly and voltage control rheostat, "A" vehicles.
Check for defective generator voltage regulator, "B" vehicles.

Troubleshoot generator voltage control assembly and rheostat, "A" vehicles, and generator voltage regulator, "B" vehicles (TM 9-2300-216-20).

Step 2. Check for defective generator.
Remove engine compartment deck.
Remove plug from top of generator air duct.
Start engine.
Use mirror and flashlight and look through air duct hole to determine if generator is rotating.
Stop engine.

a. If generator was rotating, troubleshoot for faulty generator (TM 9-2300-216-20). Install engine compartment deck.

b. If generator was not rotating, go to step 3.

Step 3. Check for defective drive shaft.
Remove right radiator (TM 9-2300-216-20).
Check power take-off auxiliary drive shaft and universal joints for damage.
Check that power take-off to auxiliary drive shaft is connected to power take-off and auxiliary drive.

a. If drive shaft is broken, replace drive shaft or repair universal joints (TM 9-2300-216-20). Install drive shaft, right radiator and engine compartment deck.

b. If drive shaft is disconnected, secure to power take-off with four screws and lock wire and to auxiliary drive with four screws and lock wire. Install right radiator and engine compartment deck.

Step 4. Check for defective power source.
Cap disconnected radiator hoses.
Fill left radiator with water.
Start engine.
Check power take-off to auxiliary drive shaft for rotation.
Stop engine.

a. If drive shaft does not rotate, remove powerplant (TM 9-2300-216-20). Remove turbocharger and exhaust manifolds (para 5-6). Remove power take-off (para 5-5). Check power take-off for defective gears and repair (para 5-38). Install power take-off, exhaust manifolds, turbocharger and powerplant. Install right radiator and engine compartment deck.

b. If drive shaft rotates, remove auxiliary drive (TM 9-2300-216-20). Check auxiliary drive for defective gears and repair input drive subassembly (para 6-35) and generator drive subassembly (para 6-29). Install auxiliary drive and right radiator. Install engine compartment deck.

21. MAGNETIC CLUTCH DOES NOT OPERATE.

Step 1. Remove fan well deck.
Start engine.
Turn magnetic clutch switch to ON.

Table 3-1. Troubleshooting — Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

POWER TAKE-OFF AND AUXILIARY DRIVE — Continued

21. MAGNETIC CLUTCH DOES NOT OPERATE — Continued

Check that fan is operating and that magnetic clutch does not turn drive shaft.

Stop engine.

a. If fan was operating, troubleshoot for faulty magnetic clutch switch or electrical circuits (TM 9-2300-216-20). Install fan well deck.

b. If fan was not operating, troubleshoot power take-off and auxiliary drive MALFUNCTION 20, step 3 and step 4. Install fan well deck.

Step 2. Check for defective auxiliary drive-to-magnetic clutch drive shaft.

Remove engine compartment deck and fan well deck.

Remove auxiliary drive (TM 9-2300-216-20).

Remove magnetic clutch drive shaft subassembly from auxiliary drive (para 6-4e).

Check drive shaft subassembly for damage.

a. Repair defective drive shaft subassembly (para 6-17). Install drive shaft subassembly. Install auxiliary drive. Install engine compartment and fan well deck.

b. If drive shaft subassembly is not defective, proceed to step 3.

Step 3. Check for maladjusted or defective magnetic clutch.

Remove magnetic clutch (para 6-4d).

Check air gap on "A" vehicles magnetic clutch (6-15l).

Check magnetic clutch for damage and worn clutch plates.

a. Adjust air gap on "A" vehicles magnetic clutch (para 6-15*l*). Install magnetic clutch and auxiliary drive. Install engine compartment deck and fan well deck.

b. If magnetic clutch is damaged or clutch plates are worn, repair magnetic clutch (para 6-9). Install magnetic clutch and auxiliary drive. Install engine compartment deck and fan well deck.

22. FAN DOES NOT OPERATE.

Step 1. Remove fan well deck.

Check for broken fan belts.

a. If fan belts are not broken, proceed to step 3.

b. If fan belts are broken, check for seized fan bearings (step 2) before proceeding to c.

c. Aline fan pulley (TM 9-2300-216-20).

d. Replace fan belts with new set (TM 9-2300-216-20).

e. Adjust fan belt tensioner (TM 9-2300-216-20). Repair fan belt tensioner, if required (TM 9-2300-216-20).

f. Install fan well deck.

Step 2. Check for defective fan bearings.

Remove fan well deck.

Check fan housing for evidence of impeller interference (scratches or gouges).

Loosen fan belt tensioner.

Rotate impeller by hand.

Push and pull impeller forward and back by hand (not rotating) and check for excessive play or looseness.

If evidence of impeller interference is found, if impeller has excessive play, or if impeller will not rotate, remove fan (TM 9-2300-216-20). Check fan for defective bearings and repair (para 8-9). Install fan and fan well deck.

Step 3. Check for defective fan power source.

Remove fan well deck.

Remove fan belts (TM 9-2300-216-20).

Start engine.

Check fan sheave for rotation.

Stop engine.

If fan sheave does not rotate, troubleshoot power take-off and auxiliary drive, MALFUNCTION 20, step 3 and step 4. Install fan belts and fan well deck.

Step 4. Check for defective auxiliary drive-to-magnetic clutch drive shaft.

Remove engine compartment deck and fan well deck.

Remove auxiliary drive (TM 9-2300-216-20).

Remove magnetic clutch drive shaft subassembly from auxiliary drive (para 6-4e).

Check drive shaft subassembly for damage.

Repair defective drive shaft subassembly (para 6-17). Install drive shaft subassembly. Install auxiliary drive. Install engine compartment deck and fan well deck.

HULL HYDRAULIC SYSTEM

23. NO PRESSURE IN HYDRAULIC SYSTEM.

Step 1. Check that hydraulic reservoir drain valve is closed.

Close hydraulic reservoir drain valve.

Step 2. Check hydraulic fluid level in hydraulic reservoir.

If fluid level is low, fill with hydraulic fluid, (LO 9-2300-216-12).

Step 3. Check that accumulator drain (pressure dump) valve is completely closed.

Close accumulator drain valve.

Table 3-1. Troubleshooting — Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

HULL HYDRAULIC SYSTEM — Continued

23. NO PRESSURE IN HYDRAULIC SYSTEM — Continued

Step 4. Check for hydraulic fluid leakage.
Remove engine and transmission deck assemblies.
Remove batteries and battery tray.
Remove fan well deck.
Check hull, turret well and driver's compartment and all hydraulic components for evidence of hydraulic fluid leakage.

Tighten loose connections. Replace damaged or leaking hydraulic components (TM 9-2300-216-20). Install fan well deck. Install battery tray and batteries. Install engine and transmission compartment decks.

Step 5. Check for defective oil pressure switch or electrical circuits.

Troubleshoot oil pressure switch and electrical circuits (TM 9-2300-216-20).

Step 6. Check for defective safety relief valve.

Troubleshoot safety relief valve (TM 9-2300-216-34/2).

Step 7. Check for drive shaft rotation.
Remove fan well deck.
Start engine.
Turn magnetic clutch switch to ON.
Check magnetic clutch to carrier bearing drive shaft for rotation.
Turn magnetic clutch switch to OFF and stop engine.

a. If drive shaft rotates, remove rotary pump (para 4-23). Check rotary pump for defective gears or broken shaft and repair (para 12-3). Install rotary pump and fan well deck.

b. If drive shaft does not rotate, check for defective power take-off, auxiliary drive, magnetic clutch or drive lines. Troubleshoot POWER TAKE-OFF AND AUXILIARY DRIVE, MALFUNCTION 21. Install fan well deck.

24. LOCKOUT CYLINDER(S) DO NOT LOCK.

Step 1. Check for hydraulic fluid leakage.
Remove engine and transmission deck assemblies.
Remove batteries and battery tray.
Remove fan well deck.
Check lockout cylinders, suspension lines and fittings and suspension control valve for evidence of hydraulic fluid leakage.

Tighten loose connections. Replace damaged or leaking hydraulic components (TM 9-2300-216-20). Install fan well deck. Install battery tray and batteries. Install engine and transmission compartment decks.

Step 2. Check for faulty lockout system pressure switch, suspension locked indicator light and electrical circuits.

Troubleshoot for defective pressure switch, indicator light and electrical circuits (TM 9-2300-216-20).

Step 3. Check for defective lockout cylinders.
Start engine.
Turn SUSPension VALVE to LOCKED.
Drive vehicle over 2 inch by 4 inch wood block while second man observes if road wheel moves upward in relation to hull as road wheel rides over block.
Turn SUSPension VALVE to UNLOCKED and stop engine.

NOTE

M107 vehicles serial number 297 and on and M110 vehicles serial number 413 and on are not equipped with lockout cylinders for middle (3rd) road wheels.

If any road wheel moved upward in relation to hull, the corresponding lockout cylinder is defective. Remove lockout cylinder (TM 9-2300-216-20). Check lockout cylinder for O-ring leakage and broken return spring and repair (para 14-3).

25. SPADE DOES NOT RAISE OR LOWER.

Step 1. Check for spade shut-off valve is open.

Open spade shut-off valve.

Step 2. Check that spade cylinder lock on each cylinder is disengaged.

Disengage spade cylinder lock on each cylinder.

Step 3. Remove hull back hydraulic access cover.
Check control valve, manifold, pressure reducing valve and fittings for evidence of hydraulic fluid leakage.
Rotate spade control lever and observe control valve actuating shaft for corresponding movement.

a. Tighten loose connections. Replace damaged or leaking components (para 4-59, "A" vehicles; para 4-60, "B" vehicles). Install hull back hydraulic access cover.

b. If control valve shaft does not move when spade control lever is activated, replace broken lever or shaft (para 4-59, "A" vehicles; para 4-60, "B" vehicles). Install hull back hydraulic access cover.

Step 4. Check spade pressure and return tubes, hoses and fittings for evidence of hydraulic fluid leakage.

Tighten loose connections. Replace damaged or leaking hydraulic components (TM 9-2300-216-20).

Step 5. Check for defective spade cylinder(s).
Relieve spade system hydraulic pressure (TM 9-2300-216-20).
Disconnect and plug right spade cylinder pressure and return hoses.
Actuate hydraulic power system and attempt to raise and lower spade several times.
Relieve spade system hydraulic pressure.

Table 3-1. Troubleshooting — Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

HULL HYDRAULIC SYSTEM — Continued

25. SPADE DOES NOT RAISE OR LOWER — Continued

Remove plugs and connect right spade cylinder pressure and return hoses.

Repeat above procedure for left spade cylinder.

If either or both spade cylinders fail to operate or operate unusually slow or erratic, remove spade cylinder (TM 9-2300-216-20). Check spade cylinder for O-ring leakage or clogged bypass orifaces and repair (para 13-3). Install spade cylinder(s) and connect pressure and return hoses.

26. PUMP CYCLES MORE THAN NORMAL.

Step 1. Check that accumulator drain (pressure dump) valve is completely closed.

Close accumulator drain valve.

Step 2. Check for hydraulic fluid leakage.

Remove engine and transmission deck assemblies.

Remove batteries and battery tray.

Remove fan well deck.

Remove hull back hydraulic access cover.

Check entire vehicle hydraulic system for evidence of hydraulic fluid leakage.

Tighten loose connections. Replace damaged or leaking hydraulic components (TM 9-2300-216-20). Install hull back hydraulic access cover. Install fan well deck. Install battery tray and batteries. Install engine and transmission decks.

Step 3. Check for faulty oil pressure switch or electrical circuits.

Troubleshoot for defective oil pressure switch and electrical circuits (TM 9-2300-216-20).

Step 4. Close accumulator drain (pressure dump) valve.

Start engine and actuate magnetic clutch while second man observes loader and rammer hydraulic gage.

Turn magnetic clutch to off and stop engine.

If loader and rammer pressure gage did not jump to approximately 1200 psi and then climb slowly to 2400 psi, check and charge accumulator nitrogen gas bottle (TM 9-2300-216-20). If gas bottle will not retain proper charge, troubleshoot for leaks and defective accumulator (TM 9-2300-216-34-2).

TURRET HYDRAULIC SYSTEM

REFER TO TM 9-2300-216-34-2 AND TM 9-2300-216-34-3 FOR TROUBLESHOOTING OF TURRET HYDRAULIC SYSTEM.

CHAPTER 4
MAJOR COMPONENTS REMOVAL AND INSTALLATION

Section I. DISASSEMBLY OF VEHICLE INTO MAJOR COMPONENTS

4-1. General

This section contains information for the guidance of personnel performing major repair work. It provides a systematic assembly line procedure for the disassembly of the vehicle into its major components. It designates what constitutes a major component, illustrates the points of connections between major components, and states briefly what must be done.

4-2. Preparation for Disassembly of Vehicle

a. General.

(1) The vehicle shall be cleaned as thoroughly as is practicable considering the time available for the maintenance operation to be performed. The affected component and adjacent area shall always be cleaned.

(2) Be sure that tools and spare parts required are readily available. Provide envelopes, covers, tarpaulins, lines, plugs, or other material that may be required for protection of the vehicle and exposed components until repairs are made. Provide small parts containers, tags, wire, or terminal markers, as required.

(3) Provide hoisting or lifting equipment for heavy components and supports and benches or stands to receive the components upon removal.

(4) Sufficient personnel shall be available and they shall be thoroughly advised of their duties before work is started. Provide personnel with protective equipment as may be required, such as gloves, goggles, special clothing, etc.

(5) Remove items of basic issue items list (BIIL), armament, or vehicular components that interfere with removal or installation of affected components. When disconnecting tubes, hoses or fittings that will result in loss of fluids, provide containers to catch fluids at disconnect points. Open hull and engine compartment drain valves to drain possible accumulations of water, fuel, and oil. If complete disassembly of the vehicle is to be performed as an assembly line procedure, pump out or drain the fuel tank, drain hydraulic reservoir, and drain cooling system. While the component is removed from the vehicle, cap open lines and clean exposed hull or compartment areas thoroughly.

b. Basic Issue Items Removed. Remove all basic issue items (BII) from the vehicle. Box and store for subsequent installation. For a list of all basic issue items and their location on the vehicle refer to TM 9-2300-216-10.

c. Sighting and Fire Control Equipment Removal.

(1) *Removal.* Remove all sighting and fire control equipment from the vehicle. Box and store for subsequent installation. For removal procedures, refer to TM 9-2300-216-20.

(2) *Repair.* Maintenance instructions for the sighting and fire control equipment are contained in the technical manuals listed in table 4-1.

Table 4-1. Sighting and Fire Control Equipment Maintenance Manuals

Publication number	Title
TM 9-1590	Ordnance maintenance: Fuze setters M14, M22, M23, M25 and M27
TM 9-1608E	Ordnance maintenance: Periscopes M12, M13, M13B1, M14, M14A1, M17 and T22
TM 9-1240-288-35	Direct support, general support, and depot maintenance manual: Telescope, elbow M16A1D, M16A1F, M16A1G, M116, and M116C
TM 9-1240-295-35	Field and depot maintenance manual: Telescope mount M138
TM 9-1290-100-14&P	Operator's organizational, direct support and general support maintenance manual for Quadrant, fire control (gunner's) M1A w/e (NSN 1290-00-891-9999) and M1A2 (radio active) w/e (NSN 1290-00-169-1937) (including organizational, direct support, general support and depot maintenance repair parts and special tools for quadrant, fire control (gunner's) M1A1 only)
TM 9-1290-322-35	Direct support, general support, and depot maintenance manual: Quadrant, fire control, elevation: M15 (T23E2) (1290-896-2236)
TM 9-1290-329-34	Direct support and general support maintenance manual including repair parts and special tools list for: Fuze setter set M63 (NSN 1290-00-966-9318)
TM 9-1290-347-34P	Direct support and general support maintenance repair parts and special tools list (including depot maintenance repair parts and special tools list) for Post, aiming, M1A2 (NSN 1290-00-535-7617)
TM 9-6015	Aiming post light M14, M41, and M43
TM 9-6650-213-35P	Direct support, general support, and depot maintenance repair parts and special tools list for Periscope, M17 (6650-704-3549)

d. Special Purpose Kits Removal. Remove special purpose kits, if installed, box and store for subsequent installation. Refer to TM 9-2300-216-20 for removal procedures for the following:

(1) Driver's temperate zone heater kit
(2) OVE rack kit
(3) Crew shelter kit
(4) Winterization kit

(5) Arctic traction kit

(6) Crew heater kit.

e. Communications Equipment Removal. Remove radio sets, RF cable to turret and control boxes. For identification and location of components refer to TM 9-2300-216-10. Coordinate removal of communications equipment with communications maintenance personnel.

f. Cannon, Mount and Loader and Rammer Removal. Remove the following items from the vehicle in accordance with instructions in TM 9-2300-216-34/3:

(1) 175-MM Gun, Cannon M113/M113A1

(2) 8-Inch Howitzer, Cannon M2A2

(3) Gun Mount M158 or Gun Mount M174

(4) Equilibrators

(5) Loader and Rammer Assembly

(6) Loader and Rammer Stow Position Lock, "B" Vehicles

(7) Loader and Rammer Ram Position Lock, "B" Vehicles.

g. Turret and Components Mounted on Turret. Remove turret components in accordance with instructions in TM 9-2300-216-34-2.

4-3. Wedge Type Travel Lock Removal, "B" Vehicles

Remove wedge type travel lock. For removal procedure, refer to TM 9-2300-216-20.

4-4. Spade Cylinder Removal

Remove spade cylinder. For removal procedure, refer to TM 9-2300-216-20.

4-5. Spade Removal

Remove spade. For removal procedure, refer to TM 9-2300-216-20.

4-6. Battery and Battery Tray Removal

Remove battery and battery tray. For removal procedure, refer to TM 9-2300-216-10.

4-7. Hull Decks and Miscellaneous Components Removal

(Fig. 4-1)

Remove hull decks and miscellaneous components. Refer to TM 9-2300-216-20 for removal procedures for the following:

a. Engine deck assembly (A)
b. Transmission deck assembly (A)
c. Deck support beam (K)
d. Fanwell deck assembly, "A" vehicles (B)
e. Fanwell deck assembly, "B" vehicles (B)
f. Fuel filler cover (C)
g. Fender extension step (D)
h. Aft cowl (G)
i. Forward cowl (H)
j. Insulating pad (J)
k. Driver's hatch hook, "A" vehicles (F)
l. Driver's cupola hold open latch, "B" vehicles (F)

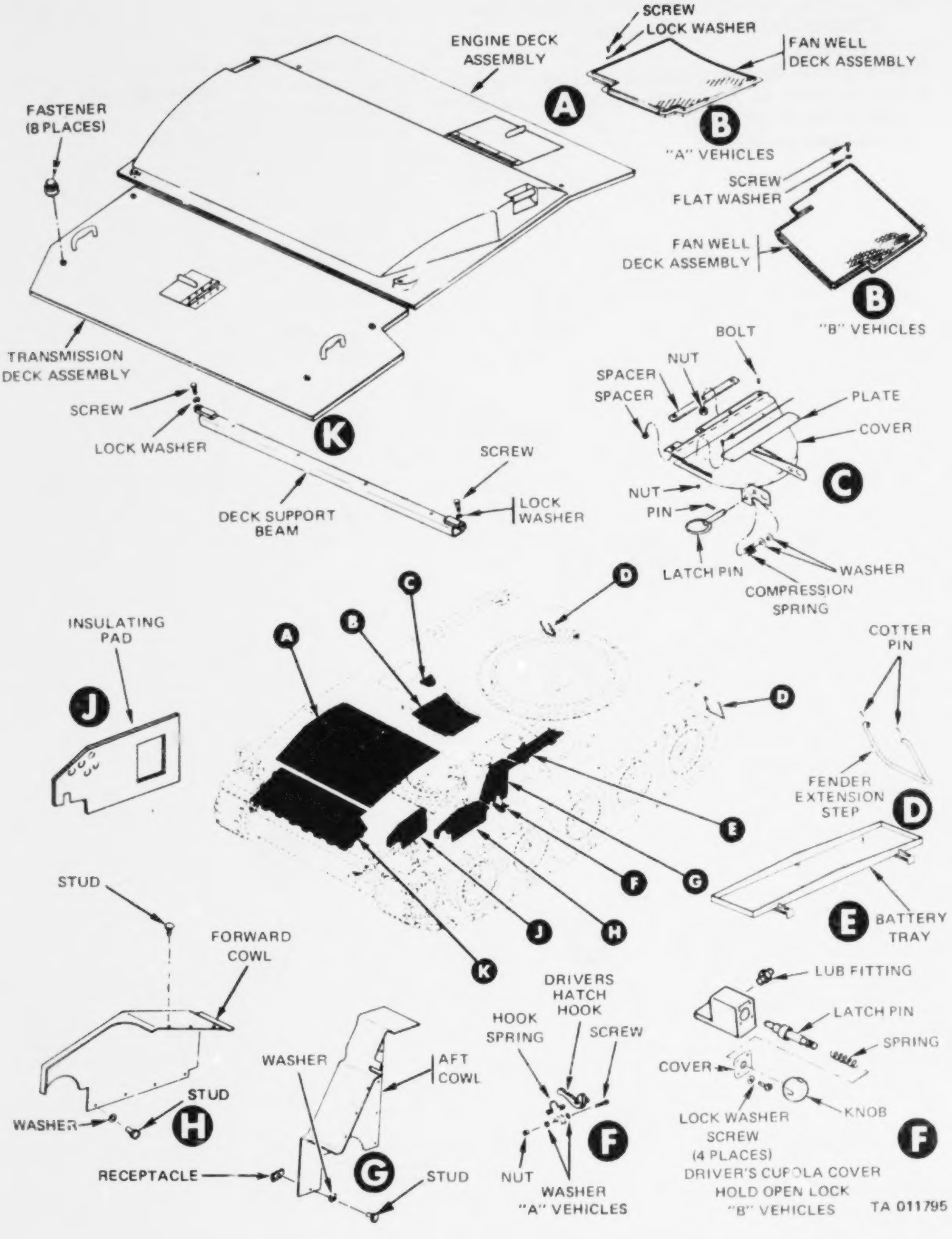

SCREW
LOCK WASHER
FAN WELL DECK ASSEMBLY
ENGINE DECK ASSEMBLY
A
B
"A" VEHICLES
FASTENER (8 PLACES)
SCREW
FLAT WASHER
FAN WELL DECK ASSEMBLY
B
"B" VEHICLES
TRANSMISSION DECK ASSEMBLY
SCREW
LOCK WASHER
K
SCREW
LOCK WASHER
DECK SUPPORT BEAM
BOLT
NUT
SPACER
SPACER
PLATE
COVER
C
NUT
PIN
LATCH PIN
WASHER
COMPRESSION SPRING
D
C
D
INSULATING PAD
J
A
B
D
COTTER PIN
FENDER EXTENSION STEP
D
E
G
F
E
BATTERY TRAY
J
H
K
STUD
FORWARD COWL
LUB FITTING
LATCH PIN
DRIVERS HATCH HOOK
HOOK SPRING
SCREW
SPRING
WASHER
AFT COWL
COVER
STUD
WASHER
H
LOCK WASHER
KNOB
SCREW (4 PLACES)
F
RECEPTACLE
G
STUD
NUT
F
WASHER
"A" VEHICLES
DRIVER'S CUPOLA COVER HOLD OPEN LOCK
"B" VEHICLES
TA 011795

Figure 4-1. Hull decks and miscellaneous components removal or installation.

4-8. Guards, Harness Protection Plate and Fender Extension Removal

(Fig. 4-2)

Remove guards, harness protection plate and fender extensions. Refer to TM 9-2300-216-20 for removal procedures for the following:

a. Headlamp guard (A)

b. Mud guard (B)

c. Hose guard (C)

d. Harness protection plate (D)

e. Tube guard, "B" vehicles (E)

f. Left fender extension (F)

g. Right fender extension (G).

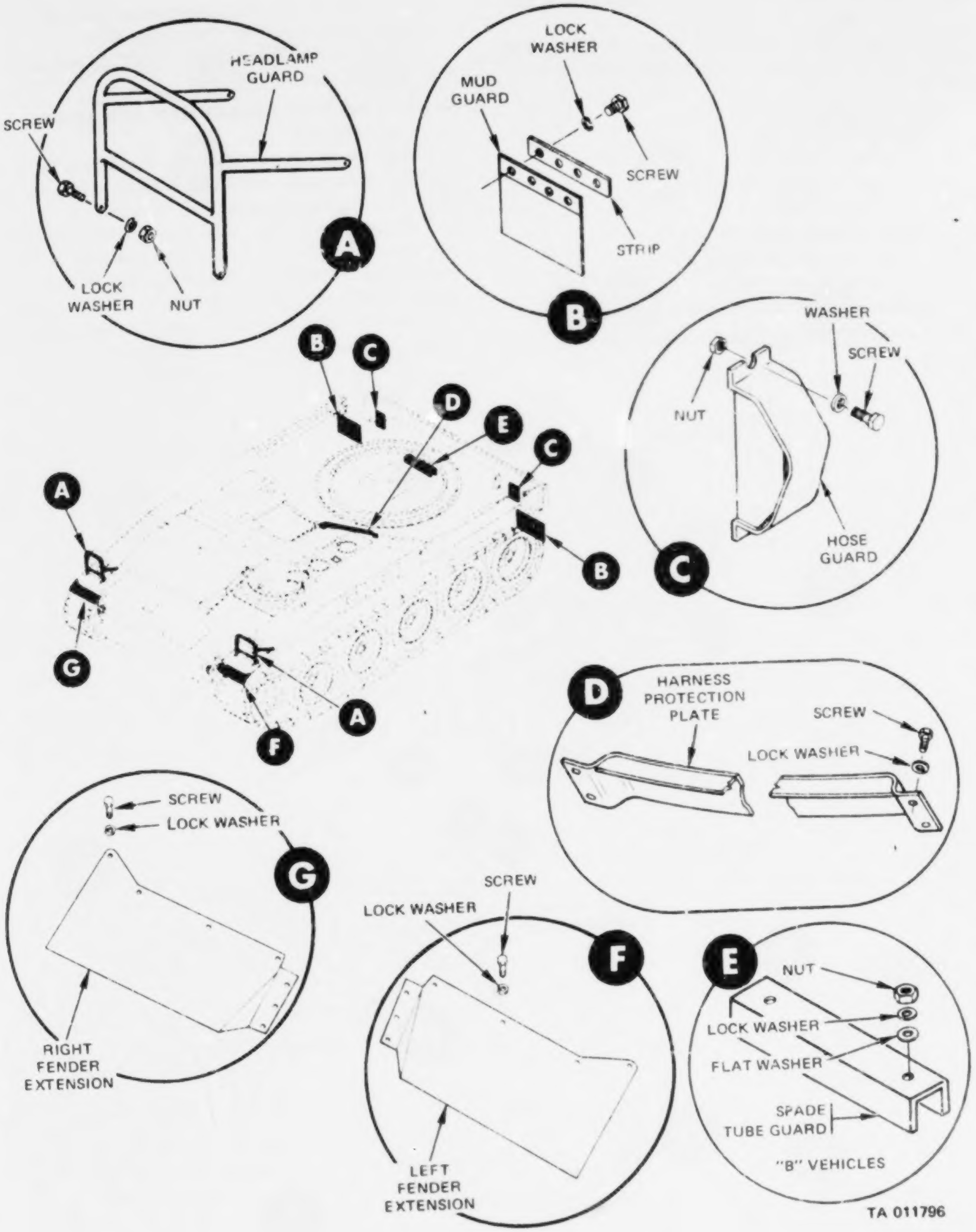

HEADLAMP GUARD
SCREW
LOCK WASHER
NUT
A
LOCK WASHER
MUD GUARD
SCREW
STRIP
B
WASHER
SCREW
NUT
HOSE GUARD
C
D
HARNESS PROTECTION PLATE
SCREW
LOCK WASHER
E
NUT
LOCK WASHER
FLAT WASHER
SPADE TUBE GUARD
"B" VEHICLES
F
SCREW
LOCK WASHER
LEFT FENDER EXTENSION
G
SCREW
LOCK WASHER
RIGHT FENDER EXTENSION
TA 011796

Figure 4-2. Guards, harness protection plate and fender extension removal or installation.

4-9. Hull Covers, Doors and Plugs Removal
(Fig. 4-3)

Remove hull covers, doors and plugs. Refer to TM 9-2300-216-20 for removal procedures for the following:

a. Battery access door (A)
b. Hull access cover (B)
c. CO_2 cylinder cover (C)
d. Two rear hydraulic covers (E)
e. Hull cleanout cover (F)
f. Aft air cleaner blower cover (G)
g. Aft air cleaner door (H)
h. Fanwell cleanout cover (J)
i. Engine fuel filter access door (L)
j. Transmission and radiator drain covers (M)
k. Forward air cleaner blower motor door (K)
l. Powerplant reservoir drain cover (N)
m. Fuel cell hull drain plug(s), one ("A" vehicles) or two ("B" vehicles) (P)

4-10. Fuel Cell Access Covers Removal
(C, fig. 4-3)

a. Remove 20 cap screws and lock washers securing left fuel cell access cover to deck. Remove fuel cell access cover. Remove gasket ("A" vehicles).

b. Remove two socket head screws retaining gasket and securing fabric fuel cell mounting ring to access cover ring ("B" vehicles). Remove gasket. Reinstall two socket head screws and hand tighten ("B" vehicles).

c. Remove right fuel cell access cover and gasket by repeating *a* and *b* above ("B" vehicles).

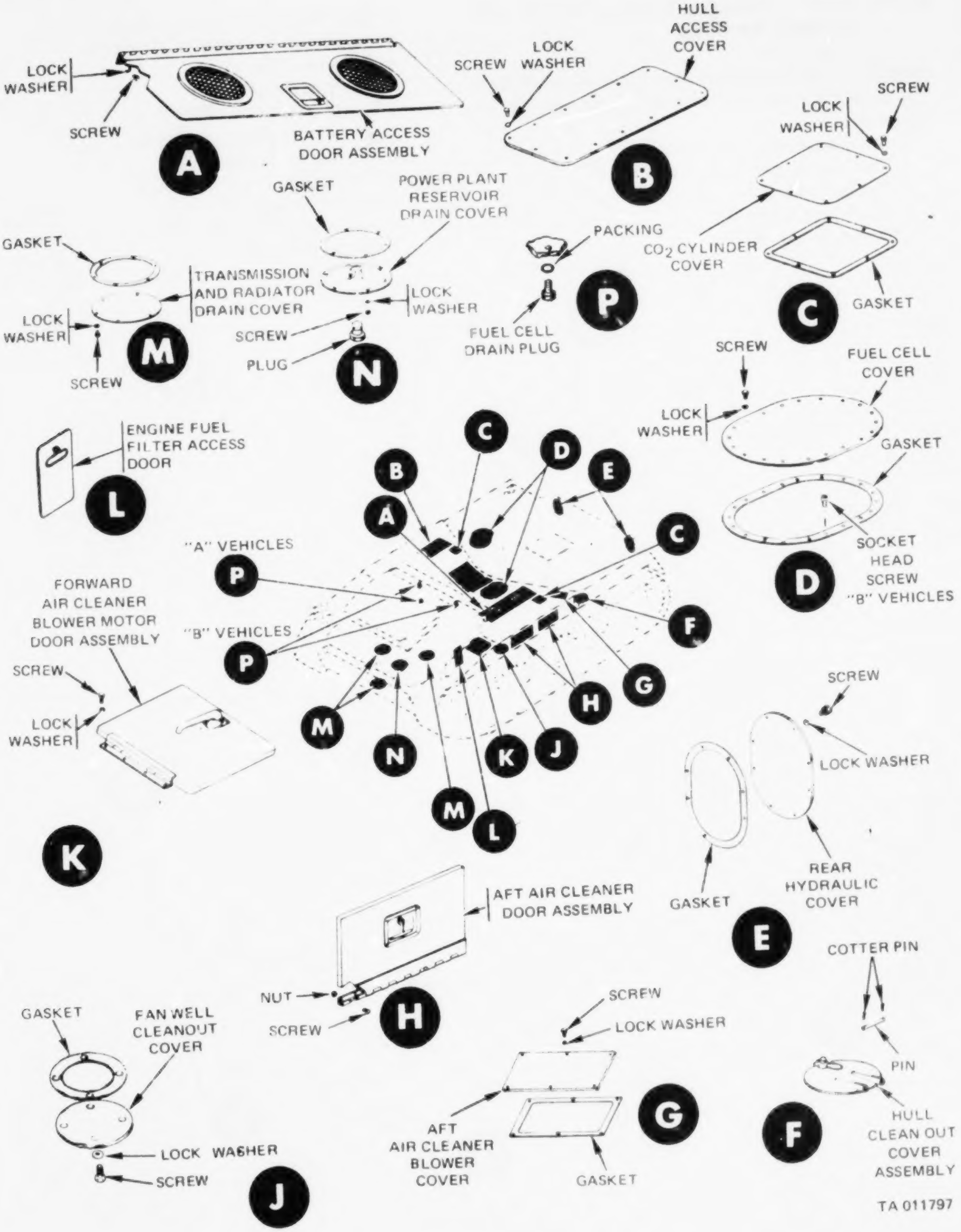

LOCK WASHER
SCREW
BATTERY ACCESS DOOR ASSEMBLY
A
SCREW
LOCK WASHER
HULL ACCESS COVER
B
LOCK WASHER
SCREW
CO2 CYLINDER COVER
GASKET
C
GASKET
POWER PLANT RESERVOIR DRAIN COVER
GASKET
TRANSMISSION AND RADIATOR DRAIN COVER
LOCK WASHER
SCREW
M
LOCK WASHER
SCREW
PLUG
N
PACKING
FUEL CELL DRAIN PLUG
P
SCREW
FUEL CELL COVER
LOCK WASHER
GASKET
SOCKET HEAD SCREW "B" VEHICLES
D
ENGINE FUEL FILTER ACCESS DOOR
L
"A" VEHICLES
P
"B" VEHICLES
P
A
B
C
D
E
C
F
G
H
J
K
L
M
N
M
FORWARD AIR CLEANER BLOWER MOTOR DOOR ASSEMBLY
SCREW
LOCK WASHER
K
SCREW
LOCK WASHER
GASKET
REAR HYDRAULIC COVER
E
AFT AIR CLEANER DOOR ASSEMBLY
NUT
SCREW
H
COTTER PIN
PIN
HULL CLEAN OUT COVER ASSEMBLY
F
GASKET
FAN WELL CLEANOUT COVER
LOCK WASHER
SCREW
J
SCREW
LOCK WASHER
AFT AIR CLEANER BLOWER COVER
GASKET
G
TA 011797

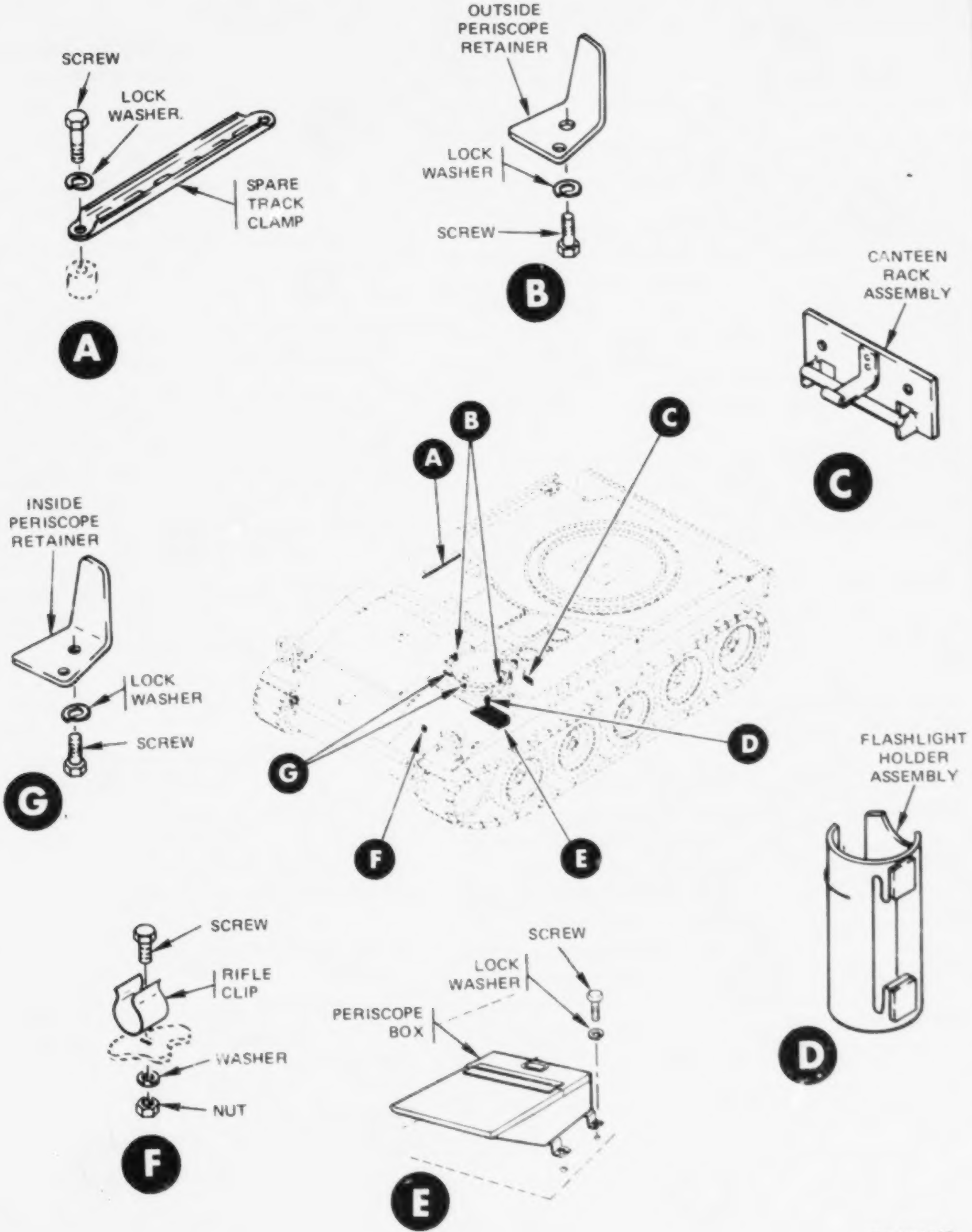
Figure 4-3. Hull covers, doors and plugs removal or installation.

4-11. Hull Stowage Racks, Clips and Holders Removal

(Fig. 4-4)

Remove hull stowage racks, clips and holders. Refer to TM 9-2300-216-20 for removal procedures for the following:

a. Spare track clamp (A)
b. Two outside periscope retainers (B)
c. Canteen rack (C)
d. Flashlight holder (D)
e. Periscope box (E)
f. Rifle clip (F)
g. Two inside periscope retainers (G)
h. Rifle rack (H)
i. Water can bracket (J)
j. Pamphlet bracket (K)
k. Fire extinguisher bracket (L)
l. Hand grenade box (M)
m. Interphone reel bracket (N)
n. Personnel seat (P)
o. Spare track bar (Q)
p. Stowage box (R).


SCREW
LOCK WASHER
SPARE TRACK CLAMP
A
OUTSIDE PERISCOPE RETAINER
LOCK WASHER
SCREW
B
CANTEEN RACK ASSEMBLY
C
A
B
C
INSIDE PERISCOPE RETAINER
LOCK WASHER
SCREW
G
G
D
F
E
FLASHLIGHT HOLDER ASSEMBLY
D
SCREW
RIFLE CLIP
WASHER
NUT
F
SCREW
LOCK WASHER
PERISCOPE BOX
E

TA 011798

Figure 4-4. Hull stowage racks, clips and holders removal or installation (sheet 1 of 2).

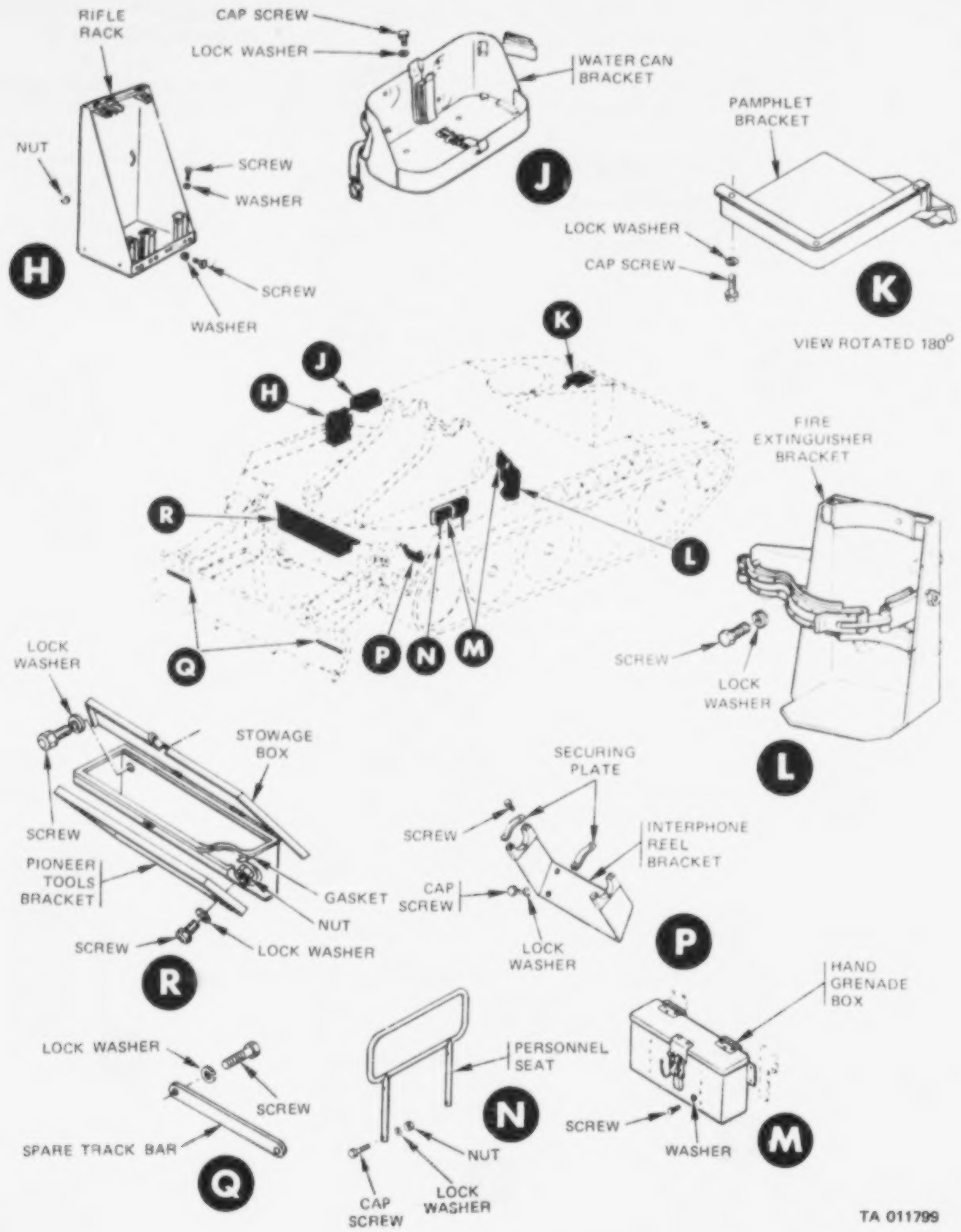

RIFLE RACK
CAP SCREW
LOCK WASHER
WATER CAN BRACKET
PAMPHLET BRACKET
NUT
SCREW
WASHER
J
H
SCREW
WASHER
LOCK WASHER
CAP SCREW
K
VIEW ROTATED 180°
K
J
H
FIRE EXTINGUISHER BRACKET
R
L
LOCK WASHER
Q
P
N
M
SCREW
LOCK WASHER
STOWAGE BOX
L
SECURING PLATE
SCREW
SCREW
INTERPHONE REEL BRACKET
PIONEER TOOLS BRACKET
GASKET
CAP SCREW
NUT
LOCK WASHER
SCREW
LOCK WASHER
P
R
HAND GRENADE BOX
LOCK WASHER
PERSONNEL SEAT
SCREW
N
SCREW
SPARE TRACK BAR
NUT
WASHER
M
Q
CAP SCREW
LOCK WASHER
TA 011799

Figure 4-4. Hull stowage racks, clips and holders removal or installation (sheet 2 of 2).

4-12. Powerplant Removal

Remove power plant. For removal procedure, refer to TM 9-2300-216-20.

4-13. Engine Mount Removal

Remove engine mount. For removal procedure, refer to TM 9-2300-216-20.

4-14. Water Hoses, Tubes and Fittings Removal

Remove water hoses, tubes and fittings. For removal procedure, refer to TM 9-2300-216-20.

4-15. Radiator Support Beam Removal

Remove radiator support beam. For removal procedure, refer to TM 9-2300-216-20.

4-16. Radiator Removal

Remove radiator. For removal procedure, refer to TM 9-2300-216-20.

4-17. Radiator Resilient Mounts Removal

Remove radiator resilient mounts. For removal procedure, refer to TM 9-2300-216-20.

4-18. Surge Tank Removal

Remove surge tank. For removal procedure, refer to TM 9-2300-216-20.

4-19. Cooling Fan, Fan Belts and Tensioner Removal

Remove cooling fan. For procedure, refer to TM 9-2300-216-20.

4-20. Generator and Scroll Housing Removal

Remove generator and scroll housing. For removal procedures, refer to TM 9-2300-216-20.

4-21. Generator Air Intake Duct and Tube Axial Fan Removal

Remove generator air intake duct and tube axial fan. For removal procedure, refer to TM 9-2300-216-20.

4-22. Auxiliary Drive Removal

Remove auxiliary drive. For removal procedure, refer to TM 9-2300-216-20.

4-23. Hydraulic Rotary Pump, Filter, Tubes, Hoses and Fittings Removal

(Fig. 4-5).

NOTE

Make sure hydraulic reservoir is drained.

a. Disconnect pump to filter hose assembly at reducer in pump and elbow in hydraulic filter and remove hose assembly.

b. Disconnect pump elbow to union tube assembly at elbow in pump and union in hose and remove tube assembly.

c. Remove lock wire and two cap screws securing rotary pump at well forward hull. Remove rotary pump and packing.

d. Remove elbow, nut, backup washer and packing from rotary pump inlet port. Remove reducer and packing from rotary pump outlet port.

e. Remove nut, two washers, lock washer and cap screw securing clamp and union-to-coupling hose to well deck. Remove clamp.

f. Disconnect union to coupling hose at coupling assembly under hydraulic reservoir and remove hose. Remove union from hose.

g. Remove coupling assembly, packing and union from under hydraulic reservoir.

h. Disconnect pressure line tube assembly from tee at well deck bracket and bushing at filter and remove tube assembly.

i. Remove three cap screws and lock washers securing hydraulic filter to well deck. Remove filter.

j. Remove elbow, nut, backup washer and packing from filter inlet port. Remove bushing, two packings and check valve from filter outlet port.

k. Disconnect pressure line tube assembly at tee in pressure supply line and tee at well deck bracket and remove tube assembly.

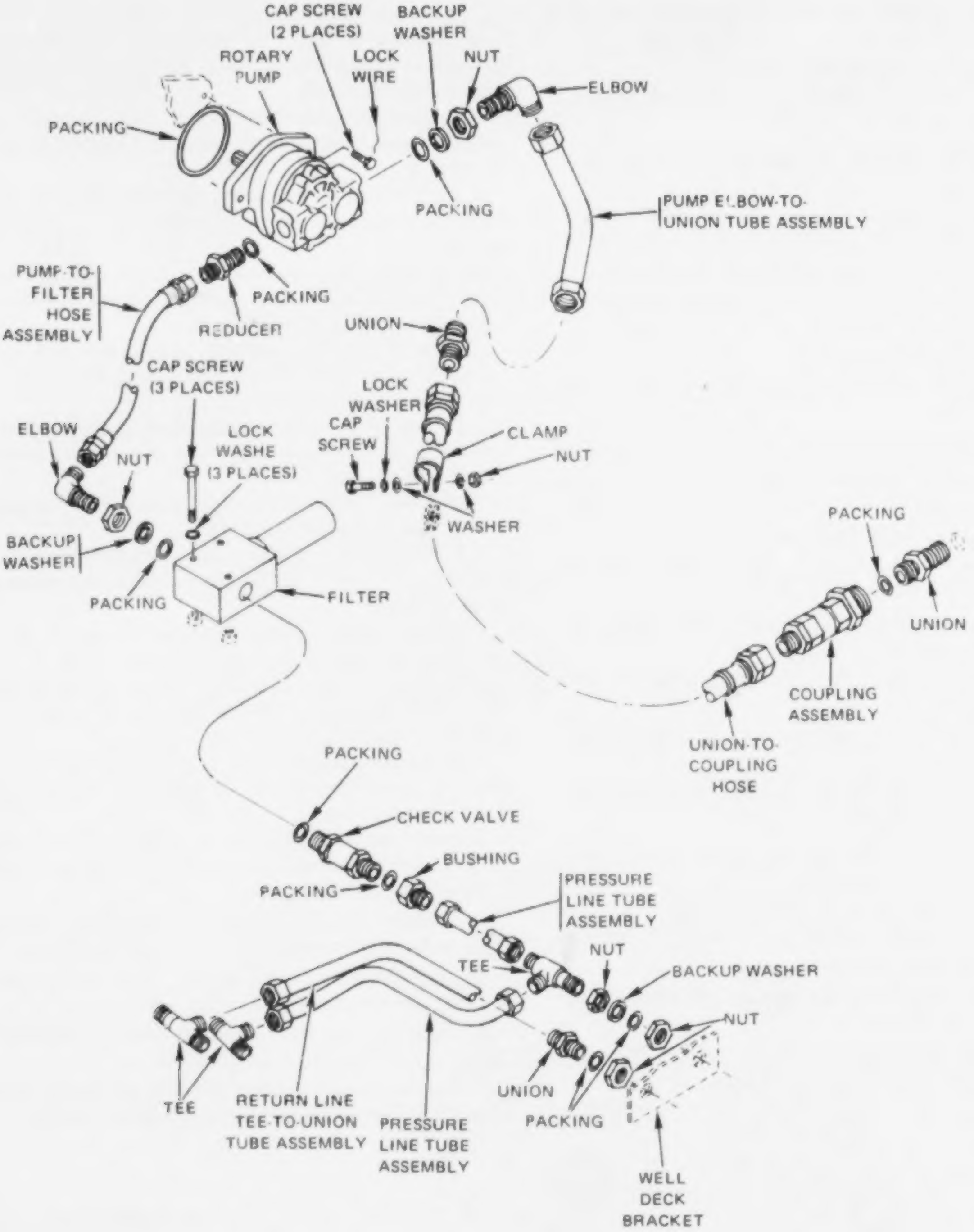
l. Disconnect return line tee-to-union tube assembly at tee in return line and union at well deck bracket and remove tube assembly.

m. Remove tee, nut, backup washer and packing from well deck bracket. Connect to hose coupling.

n. Remove union and packing from well deck bracket. Connect to hose coupling.

o. Remove two nuts used to secure couplings (removed with turret) to deck bracket.

p. Disconnect and remove pressure and return line tees. Plug lines to prevent entry of foreign matter.


CAP SCREW (2 PLACES)
BACKUP WASHER
ROTARY PUMP
LOCK WIRE
NUT
ELBOW
PACKING
PACKING
PUMP ELBOW-TO-UNION TUBE ASSEMBLY
PUMP-TO-FILTER HOSE ASSEMBLY
PACKING
REDUCER
UNION
CAP SCREW (3 PLACES)
LOCK WASHER
ELBOW
LOCK WASHE (3 PLACES)
CAP SCREW
CLAMP
NUT
NUT
WASHER
PACKING
BACKUP WASHER
FILTER
PACKING
UNION
COUPLING ASSEMBLY
UNION-TO-COUPLING HOSE
PACKING
CHECK VALVE
BUSHING
PACKING
PRESSURE LINE TUBE ASSEMBLY
NUT
TEE
BACKUP WASHER
NUT
UNION
TEE
RETURN LINE TEE-TO-UNION TUBE ASSEMBLY
PRESSURE LINE TUBE ASSEMBLY
PACKING
WELL DECK BRACKET

TA 030342

Figure 4-5. Hydraulic rotary pump, filter, tubes, hoses and fittings removal or installation.

4-24. Auxiliary Drive Shaft and Carrier Bearing Removal

Remove the drive shafts and carrier bearing. Refer to TM 9-2300-216-20 for removal procedures for the following:

a. PTO-to-auxiliary drive gearcase drive shaft

b. Magnetic clutch-to-carrier bearing drive shaft

c. Carrier bearing.

4-25. Low Pressure Fuel Hoses, Tubes, Fittings and Fuel Sump ("A" Vehicles) Removal

a. Low Pressure Fuel Hoses, Tubes and Fittings Removal. Remove low pressure fuel hoses, tubes and fittings. Refer to TM 9-2300-216-20 for removal procedures.

b. Fuel Cell Sump Removal, "A" Vehicles.

WARNING

Do not enter fuel cell until it has been completely drained and then thoroughly cleaned. Prolonged breathing of fuel vapors is fatal.

(1) Make sure that fuel cell is cleaned according to procedures described in paragraph 22-3*b*.

(2) Enter fuel cell through left access. Unfasten clamp attaching sump to tube assembly.

(3) Disconnect sump from tube and remove sump. Inspect sump for damage and replace if required.

4-26. Hull Drain Valve (Power Plant Compartment) Removal

Remove hull drain valve. For removal procedure, refer to TM 9-2300-216-20.

4-27. Driver's Cupola Cover Removal

Remove driver's cupola cover. For removal procedure, refer to TM 9-2300-216-20.

4-28. Driver's Seat and Support Post Removal

Remove driver's seat and support post. For removal procedure, refer to TM 9-2300-216-20.

4-29. Hull Drain Valve (Driver's Compartment) Removal

Remove hull drain valve. For removal procedure, refer to TM 9-2300-216-20.

4-30. Hull Drain Valve (Turret Well) Removal

Remove hull drain valve. For removal procedures, refer to TM 9-2300-216-20.

4-31. Steering Controls and Linkage Removal

Remove steering controls and linkage. For removal procedures, refer to TM 9-2300-216-20.

4-32. Throttle and Accelerator Controls Removal

Remove throttle and accelerator controls. For removal procedure, refer to TM 9-2300-216-20.

4-33. Shifting Controls and Linkage Removal

Remove shifting controls and linkage. For removal procedure, refer to TM 9-2300-216-20.

4-34. Parking Brake and Service Brake Controls and Linkage Removal

Remove parking brake and service brake controls and linkage. For Removal procedure, refer to TM 9-2300-216-20.

4-35. Tachometer and Speedometer Drive Shafts Removal

Remove tachometer and speedometer drive shafts. For removal procedure, refer to TM 9-2300-216-20.

4-36. Forward Hull Wiring Harnesses and Leads Removal

(Fig. 4-6)

This paragraph provides procedures for the removal or wiring harnesses and leads from the forward hull. All attaching hardware is not called out on the supporting illustration for reasons of clarity but is covered in the procedures. Harness and lead part numbers are shown in the procedures for proper identification during installation.

a. Relay-to-Starter and Neutral Position Switch Wiring Harness Removal (11643129) (L, fig. 4-6). This harness was removed with power plant. Refer to paragraph 5-10 for removal.

b. Starter-to-Ground Lead Removal (10901839) (D, fig. 4-6). This harness was removed with power plant. Refer to paragraph 5-10 for removal procedures.

c. Bulkhead Disconnect-to-Starter Electrical Lead Removal (10901842) (J, fig. 4-6). This lead was removed with power plant. Refer to paragraph 5-10 for removal procedures.

d. Engine Warning Lights Circuits to Bulkhead Disconnect (10919945) (K, fig. 4-6). This harness was removed with power plant. Refer to paragraph 5-10 for removal procedures.

e. Disconnect-to-Headlamp Wiring Harness Removal (11592755) (A, fig. 4-6).

(1) Remove right and left headlamps. For removal procedures, refer to TM 9-2300-216-20.

(2) From inside hull, disconnect six electrical bell connectors and remove screw and washer securing ground lead lug to hull.

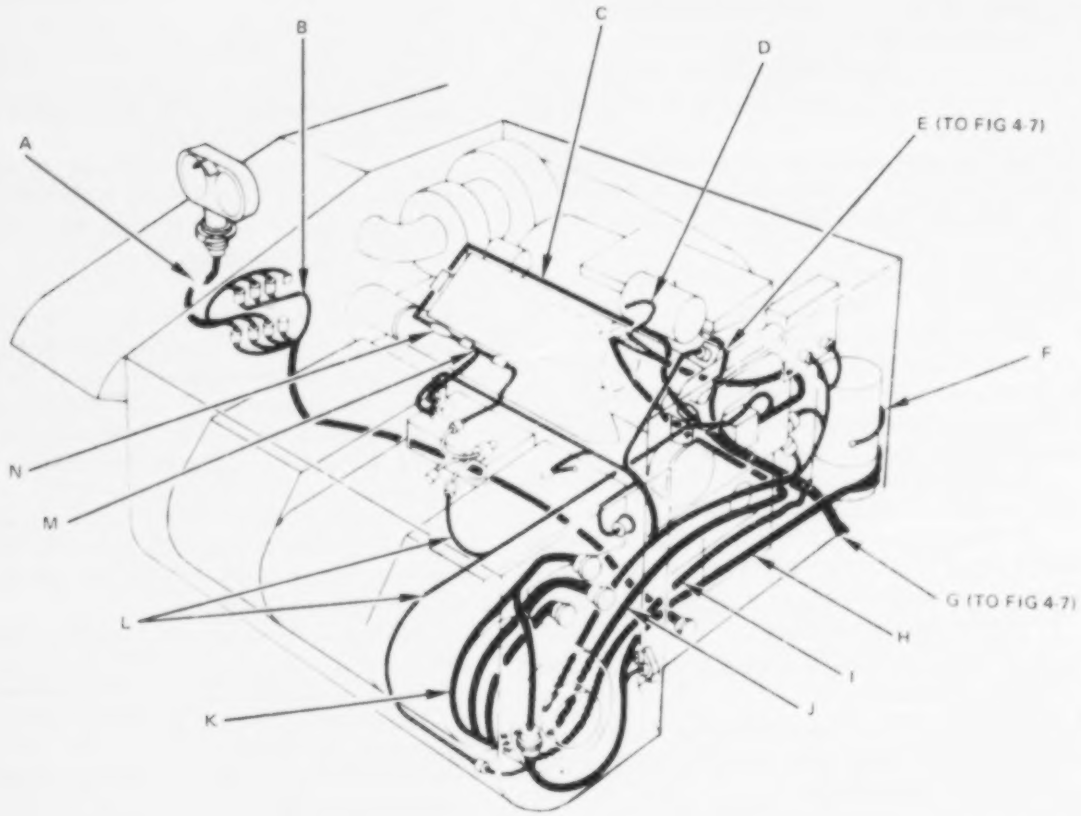
(3) Remove six screws and clips from bracket.

(4) Remove six screws and lock washers attaching harness base assembly to outside of hull. Remove harness and leads through hole in hull.

NOTE

Observe that slot in receptacle faces toward rear of vehicle when base is properly mounted. Make sure that base is installed in proper position during installation. Apply sealing compound MIL-D-22473 to mating surface of base at installation.

(5) Remove left disconnect-to-headlamp wiring harness in same manner (P, fig. 4-7).



A–Disconnect-to-headlamp wiring harness (11592755)
B–Line connection-to-right headlamp wiring harness (10901827)
C–Warning light low coolant detector-to-bulkhead disconnect harness (11675566) "B" Vehicles
D–Starter-to-ground lead (10901839)
E–Fuel purge and prime switch-to-solenoid lead (11675547) "B" Vehicles
F–Generator ground lead (10914937)
G–Low coolant warning light-to-bulkhead disconnect wiring harness (11675568) "B" Vehicles
H–Generator control circuit-to-bracket disconnect wiring harness (10919889)
I–Bulkhead disconnect-to-generator armature lead (10901840)
J–Bulkhead disconnect to starter electrical lead (10901842)
K–Bulkhead disconnect-to-engine components and warning units wiring harness (10919945)
L–Relay-to-starter and neutral position switch wiring harness (11643129)
M–Aeration detector connector assembly (11675567) "B" Vehicles
N–Aeration detector diode assembly (11631547) "B" Vehicles

TA 011800

Figure 4-6. Forward hull wiring harnesses and leads removal or installation.

f. Line Connection-to-Right Headlamp Wiring Harness Removal (10901827) (B, fig. 4-6).

(1) In driver's compartment, disconnect electrical connector from harness receptacle.

(2) Remove four screws and washers attaching harness receptacle to bulkhead in engine compartment. Remove receptacle and gasket (H, fig. 4-6) from bulkhead.

(3) Remove three screws, washers and nuts, four screws, and seven loop clamps securing harness to hull.

(4) Remove harness from hull.

g. Bulkhead Disconnect-to-Generator Armature Lead Removal (10901840) (T, fig. 4-6).

(1) Disconnect lead at generator terminal marked "B".

(2) Remove seven assembled screw and washers and seven loop clamps securing lead to hull.

(3) Disconnect lead electrical connector from bulkhead receptacle and remove lead from hull.

h. Generator Control Circuit-to-Bracket Disconnect Wiring Harness Removal (10919889) (H, fig. 4-6).

(1) Remove four screws and washers attaching harness receptacle to bracket. Remove receptacle and gasket from bracket.

(2) Disconnect line electrical connector.

(3) Disconnect two electrical bell connectors at circuit breakers.

(4) Disconnect three terminal lugs at generator terminal board and remove harness from hull.

i. Generator-to-Ground Lead Removal (10914937) (F, fig. 4-6).

(1) Remove screw and washer securing ground lead terminal lug to hull.

(2) Disconnect lead from terminal E on generator terminal board and remove lead from hull.

j. Warning Light Low Coolant Detector-to Bulkhead Disconnect Harness Removal (11675566) ("B" Vehicles) (C, fig. 4-6). This harness was removed with power plant. Refer to paragraph 5-10 for removal procedures.

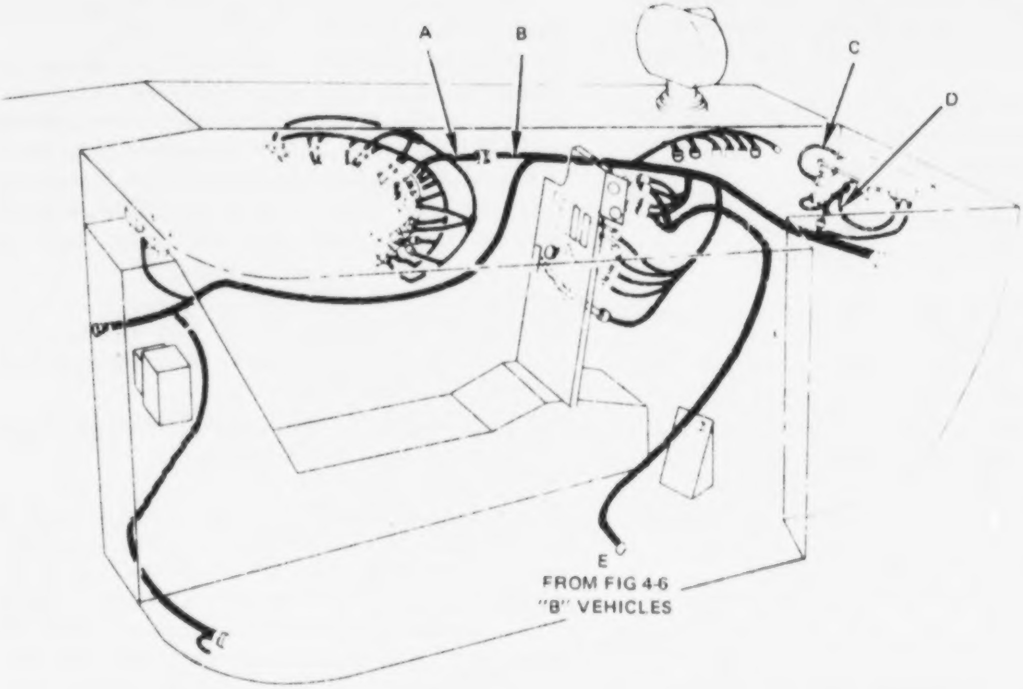
k. Aeration Detector Connector Assembly Removal (11675567) "B" Vehicles (M, fig. 4-6). This connector assembly was removed with powerplant. Refer to paragraph 5-10 for removal procedures.

l. Aeration Detector Diode Assembly Removal (11631547) "B" Vehicles (N, fig. 4-6). This assembly was removed with powerplant. Refer to paragraph 5-10 for removal procedures.

4-37. Driver's Compartment Wiring Harness and Leads Removal

(Fig. 4-7)

This paragraph provides procedures for the removal of wiring harnesses and leads from the driver's compartment. All attaching hardware is not called out on the support illustration for reasons of clarity but is covered in the procedures. Harness and lead part numbers are shown in the procedures for proper identification during installation.



A-Gages and lights disconnect-to-instrument panel wiring harness (10901838)

B-Bulkhead disconnect-to-driver's controls wiring harness (10919944)

C-Suspension lockout system warning light and horn ground electrical lead (10892526)

D-Horn-to-warning relay wiring harness (10919885)

E-Fuel purge and prime switch-to-solenoid electrical lead (11675547)

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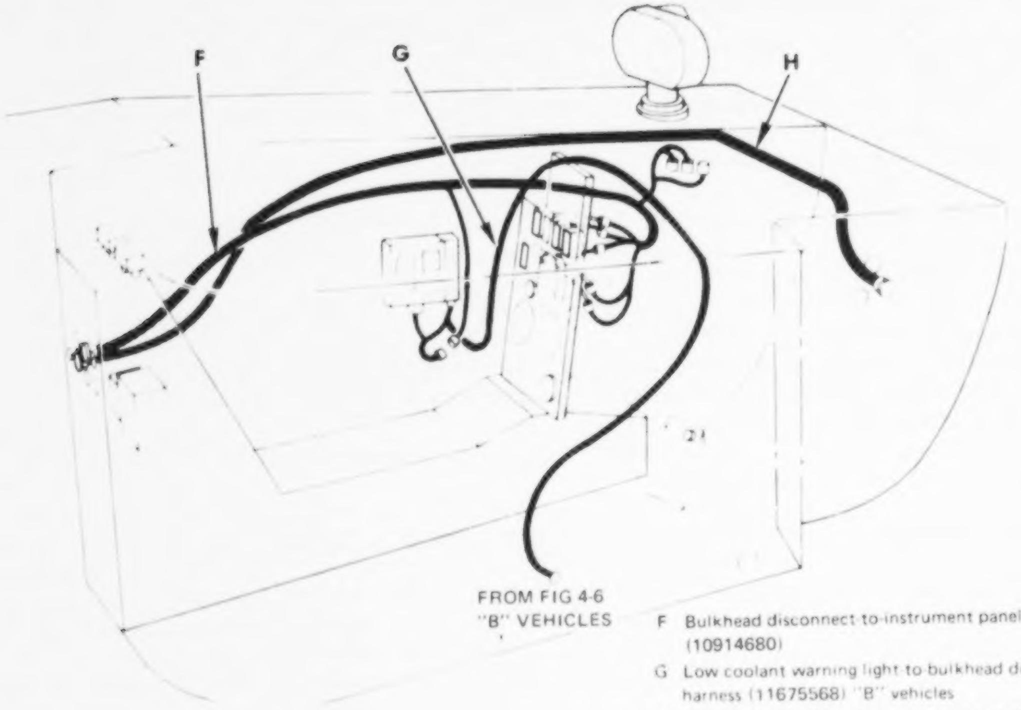
Figure 4-7. Driver's compartment wiring harness and leads removal or installation (sheet 1 of 3).



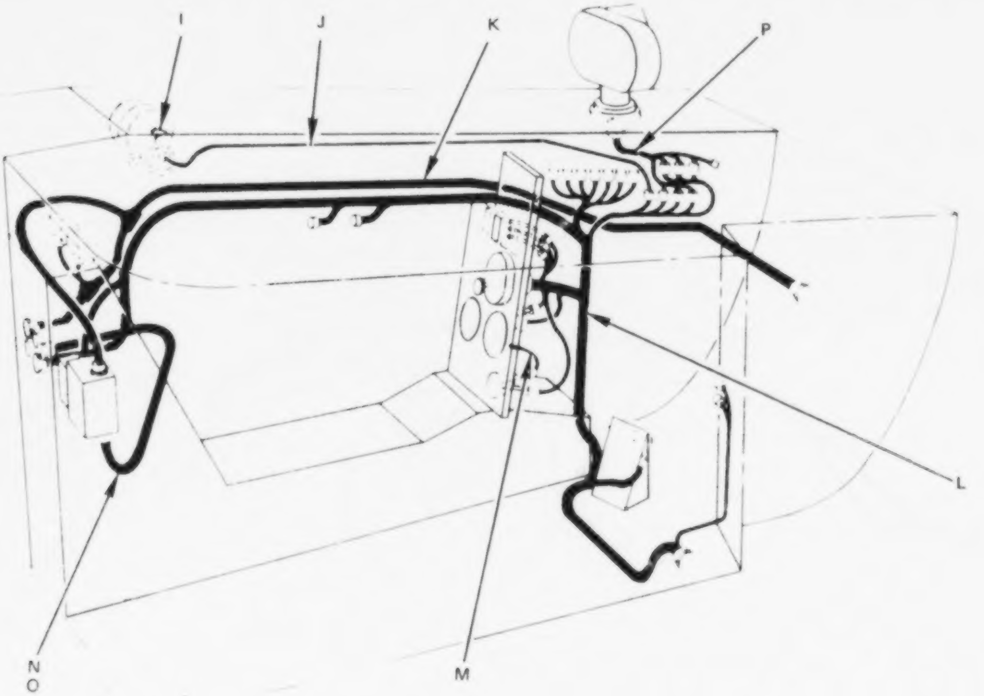
F Bulkhead disconnect-to-instrument panel wiring harness (10914680)

G Low coolant warning light-to-bulkhead disconnect wiring harness (11675568) "B" vehicles

H Bulkhead-to-bulkhead generator circuit electrical lead (10901844)

TA 030347

Figure 4-7. Driver's compartment wiring harness and leads removal or installation (sheet 2 of 3).



I Blower-to-ground electrical lead (10914828)

J Disconnect to forward air cleaner blower motor electrical lead (10934867)

K Bulkhead-to-bulkhead starter circuit electrical lead (11592731)

L Lighting switch to vehicle accessories and disconnect wiring harness (11592728)

M Suspension lockout system warning light and horn ground electrical lead (10892526)

N Master relay to bulkhead disconnect electrical lead (11592729) "A" vehicles

O Master relay to bulkhead disconnect lead (11675625) "B" vehicles

P Disconnect to headlamp wiring harness (11592755)

TA 030275

Figure 4-7. Driver's compartment wiring harness and leads removal or installation (sheet 3 of 3).

a. Gages and Lights Disconnect Instrument Panel (10901838) (A, fig. 4-7).

(1) Remove screw, washer, and loop clamp attaching wiring harness to instrument panel.

(2) Disconnect nineteen electrical bell connectors at rear of instrument panel.

(3) Remove strap holding harness. Disconnect harness from bulkhead disconnect to driver's controls wiring harness.

(4) Remove instrument panel wiring harness.

b. Horn-to-Warning Relay Wiring Harness Removal (10919885) (D, fig. 4-7).

(1) Disconnect three electrical bell connectors.

(2) Disconnect harness electrical connector from warning relay.

(3) Remove wiring harness from hull.

c. Suspension Lockout System Warning Light Ground Lead Removal (10892526) (M, fig. 4-7).

(1) Disconnect lead electrical connector from warning light.

(2) Remove screw and washer attaching ground lead lug to hull.

(3) Remove lead from hull.

d. Disconnect-to-Forward Air Cleaner Motor Electrical Lead Removal (10934867) (J, fig. 4-7).

(1) Disconnect electrical bell connector at forward air cleaner blower.

(2) Remove two assembled screws and washers and two loop clamps securing lead to hull.

(3) Remove screw and connector retaining clip from wall in blower compartment.

(4) Disconnect electrical bell connector from line disconnect and remove lead from hull.

e. Blower-to-Ground Electrical Lead Removal (10914828) (I, fig. 4-7).

(1) Remove screw and washer attaching ground

lead terminal lug to hull.

(2) Disconnect electrical bell connector at blower motor and remove lead from hull.

(3) Remove screw attaching electrical connector retaining clip to hull and remove clip.

f. Master Realy-to-Bulkhead Disconnect Electrical Lead Removal (11592729) "A" Vehicles (N, fig. 4-7).

(1) Remove cover from master relay and remove screw and washer attaching lead terminal lug.

(2) Unscrew adapter nut and pull lead from master relay.

(3) Replace screw, washer, and cover removed in step (1) above.

(4) Remove screw and loop clamp securing lead to hull.

(5) Disconnect master relay to bulkhead lead connector from receptacle at bulkhead and remove lead from hull.

g. Master Relay-to-Bulkhead Disconnect Electrical Lead Removal (11675625) "B" Vehicles (O, fig. 4-7).

(1) Disconnect master relay-to-bulkhead disconnect electrical lead connector from receptacle at master relay.

(2) Remove screw and loop clamp securing lead to hull.

(3) Disconnect master relay-to-bulkhead disconnect electrical lead from receptacle at bulkhead and remove lead from hull.

Bulkhead-to-Bulkhead Generator Circuit Electrical Lead Removal (10901844) (H, fig. 4-7).

(1) Remove ten screws and five cover assemblies, securing bulkhead to bulkhead wiring harness bundles.

(2) Disconnect generator circuit lead electrical connector from receptacle at bulkhead at rear of driver's compartment.

(3) Remove four screws and washers attaching generator circuit lead receptacle to bulkhead at right forward side of driver's compartment.

(4) Remove receptacle and gasket from bulkhead and remove lead from hull.

i. Bulkhead-to-Bulkhead Starter Circuit Electrical Lead Removal (11592731) (K, fig. 4-7).

(1) Disconnect electrical connector from receptacle at bulkhead at rear of driver's compartment.

(2) Disconnect electrical connector at master relay.

(3) Disconnect two electrical bell connectors at circuit breakers in rear of driver's compartment.

(4) Remove four screws and washers attaching lead receptacle to bulkhead at right forward side of driver's compartment.

(5) Remove receptacle and gasket from bulkhead and remove lead from hull.

j. Lighting Switch-to-Vehicle Accessories and Disconnect Wiring Harness Removal (11592728) (L, fig. 4-7).

(1) Disconnect harness electrical connector from receptacle at bulkhead in rear of driver's compartment.

(2) Disconnect electrical connector at master relay.

(3) Disconnect two electrical bell connectors at horn switch.

(4) Disconnect seven line disconnect electrical bell connectors on left forward side of driver's compartment.

(5) Disconnect electrical connector at pressure switch.

(6) Disconnect five panel light electrical connectors at instrument panel.

(7) Disconnect electrical connector from lighting switch at instrument panel.

(8) Disconnect electrical connector to dimmer switch lead.

(9) Disconnect two electrical connectors to stoplight switch.

(10) Disconnect electrical connector from forward air cleaner. Six connectors to left headlamp were disconnected in paragraph 4-36*e*. above. Connector to right headlamp was disconnected in paragraph *e*. above.

(11) Remove wiring harness from hull.

k. Bulkhead Disconnect-to-Instrument Panel Switches Wiring Harness Removal (10914680) (F, fig. 4-7).

(1) Disconnect harness electrical connector from receptacle at bulkhead at rear of driver's compartment.

(2) Disconnect electrical connector from driver's compartment light.

(3) Disconnect three line electrical connectors.

(4) Disconnect five electrical connectors at instrument panel.

(5) Remove wiring harness from hull.

l. Bulkhead Disconnect-to-Driver's Controls Wiring Harness Removal (10919944) (B, fig. 4-7).

(1) Disconnect electrical connector from receptacle at bulkhead in rear of driver's compartment.

(2) Remove screw and washer attaching ground lead lug to generator cooling fan in rear of driver's compartment.

(3) Disconnect electrical connector at generator cooling fan.

(4) Disconnect electrical connector to circuit breaker.

(5) Disconnect nine electrical connectors at instrument (gage) panel.

(6) Disconnect six line electrical connectors in forward end of driver's compartment.

(7) Remove screw and washer attaching ground lead lug in hull.

(8) Remove four screws and washers attaching gage and light circuit receptacle to bracket.

(9) Disconnect one line connector and one connec-

tor at circuit breaker.

(10) Remove four screws and washers attaching harness bulkhead disconnect receptacle to bulkhead at right front of driver's compartment. Remove receptacle and gasket from bulkhead.

(11) Remove harness from hull.

m. Horn Ground Lead Removal (10892526) (C, fig. 4-7).

(1) Disconnect lead electrical connector from warning horn.

(2) Remove screw and washer attaching ground lead lug to horn bracket.

(3) Remove lead from hull.

n. Fuel Purge and Prime Switch-to-Solenoid Lead Removal (11675547) "B" Vehicles (E, fig. 4-7).

(1) Disconnect lead connector from fuel filter prime switch connector.

(2) Remove two nuts, washers, screws, and clamps securing lead to underside of driver's compartment top hull.

(3) Remove nut, washer and screw securing clamp to grommet plate on side of driver's compartment and remove clamp.

(4) Pull split grommet from grommet plate and remove from leads.

(5) Push lead bell connector through grommet plate into engine compartment.

(6) Disconnect lead from solenoid on engine.

o. Low Coolant Warning Light-to-Bulkhead Disconnect Wiring Harness Removal (11675568) "B" Vehicles (G, fig. 4-7).

(1) Disconnect two bell connectors from low coolant detector-to-bulkhead disconnect harness located on engine (fig. 4-6).

(2) Remove nut, washer and screw securing clamp to grommet plate on side of driver's compartment and remove clamp.

(3) Pull split grommet from grommet plate on side of driver's compartment and remove from lead.

(4) Pull lead bell connectors through grommet plate into driver's compartment.

(5) Remove two nuts, washers, screws and clamps securing lead to underside of driver's compartment top hull.

(6) Disconnect two bell connectors from dome light and lead. Disconnect connector from bottom of low coolant warning light and remove harness.

4-38. Instrument (Gage) Panel Removal

Remove instrument (gage) panel. For removal procedures for instrument (gage) panel and instruments, refer to TM 9-2300-216-20.

4-39. Air Box Heater Control Panel Removal, "A" Vehicles

Remove air box heater control panel. For removal procedures, refer to TM 9-2300-216-20.

4-40. Air Box Heater and Fuel Prime and Purge Control Panel Removal, "B" Vehicles

Remove air box heater and fuel prime and purge control panel. For removal procedure, refer to TM 9-2300-216-20.

4-41. Instrument (Switch) Panel Removal

Remove instrument switch panel. For removal procedures for instrument (switch) panel, switches, and valves, refer to TM 9-2300-216-20.

4-42. Warning Horn and Circuit Breaker Mounting Plate Removal

Remove warning and circuit breaker mounting plate, with warning horn and circuit breaker. For removal procedure, refer to TM 9-2300-216-20.

4-43. Dimmer Switch and Dimmer Switch Bracket Removal

Remove dimmer switch and dimmer switch bracket. For removal procedure, refer to TM 9-2300-216-20.

4-44. Driver's Compartment Dome Light Removal

Remove driver's compartment dome light. For removal procedure, refer to TM 9-2300-216-20.

4-45. Low Coolant Level Warning Light Removal, "B" Vehicles

Remove low coolant level warning light. For removal procedure refer to TM 9-2300-216-20.

4-46. Master Relay Removal

Remove master relay. For removal procedure, refer to TM 9-2300-216-20.

4-47. Forward and Aft Air Separator Blower Removal

Remove air intake separator blower. For removal procedure, refer to TM 9-2300-216-20.

4-48. Intake Air Basket and Separator Removal

Remove the intake air basket and separator. Refer to TM 9-2300-216-20 for removal instructions.

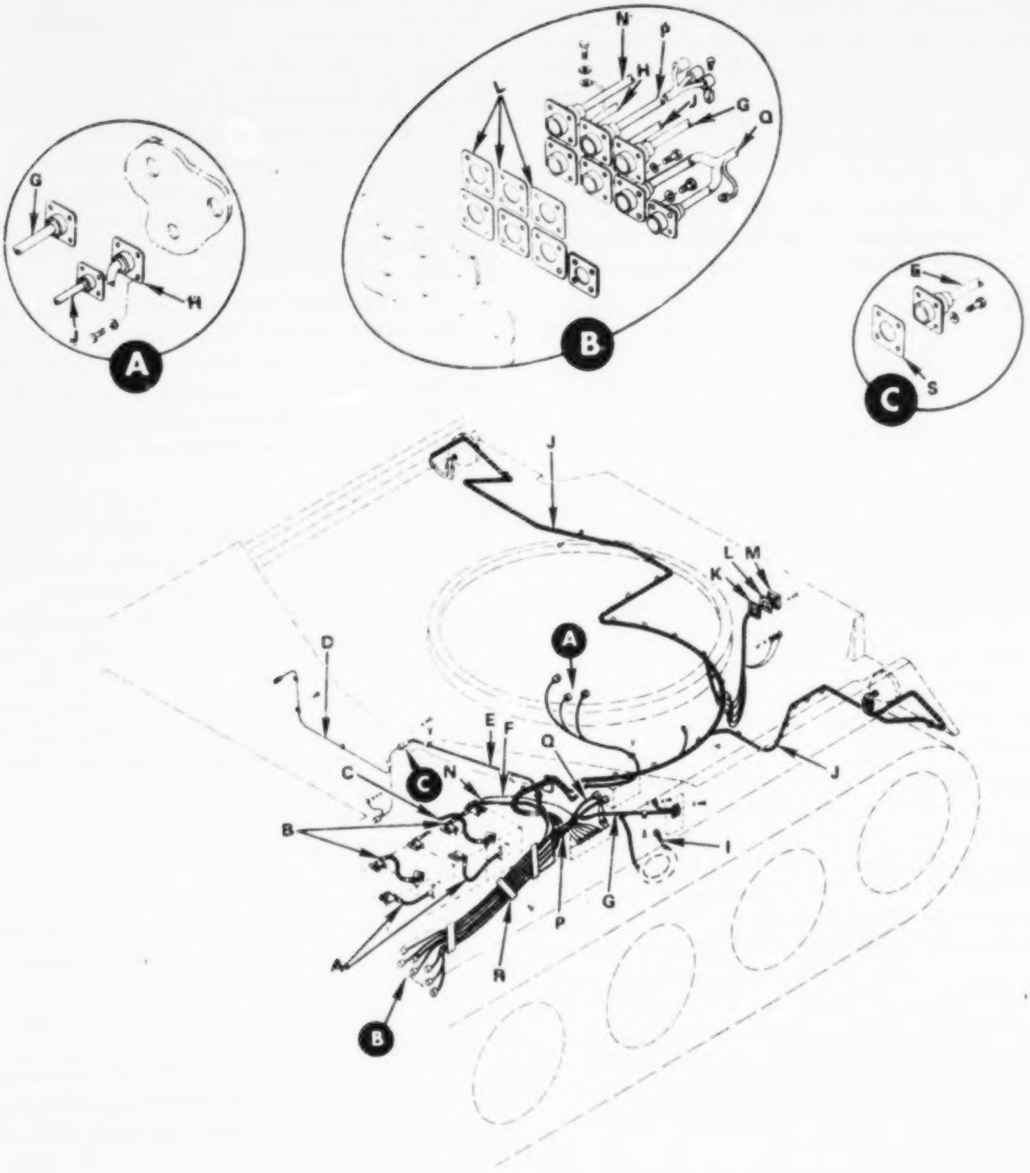
4-49. Engine Air Intake Ducts Removal

Remove engine air intake ducts. For removal procedure, refer to TM 9-2300-216-20.

4-50. Center and Rear Hull Wiring Harnesses and Leads Removal

(Fig. 4-8)

This paragraph provides procedures for the removal of wiring harnesses and leads from the center and rear hull. All attaching hardware is not called out on the supporting illustration for reasons of clarity but is covered in the procedures. Harness and lead part numbers are shown in the procedures for identification during installation.



A-Battery negative-to-ground lead (10901860)
B-Battery positive-to-battery negative lead (10901859)
C-Battery positive-to-battery positive lead (10892516)
D-Bulkhead disconnect-to-magnetic clutch lead (10901856)
E-Floor disconnect-to-bulkhead disconnect wiring harness (10901855)
F-Battery-to-circuit breaker lead (10901835)
G-Voltage regulator-to-master relay and accessories panel cable (11592734 "A" Vehicles) (11675638 "B" Vehicles)
H-Hull disconnect, interphone amplifier-to-bulkhead disconnect and driver's control box wiring harness (10908425)
I-Blower-to-ground lead (10914828)
J-Bulkhead disconnect-to-trailer receptacle and taillights wiring harness (11592733)
K-Trailer receptacle assembly-to-disconnect wiring harness (10901829)
N-Battery-to-bulkhead disconnect lead (11592730)
P-Circuit breaker-to-bulkhead disconnect wiring harness (10901853)
Q-Bulkhead disconnect-to-voltage control assembly wiring harness (10901852)

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Figure 4-8. Center and rear hull wiring harnesses and leads removal or installation.

a. Battery Positive-to-Battery Positive Lead Removal (10892516) (C, fig. 4-8). This lead was removed during battery removal (para 4-6).

b. Battery Positive-to-Battery Negative Leads Removal (10901859) (B, fig. 4-8). These two leads were removed during battery removal (para 4-6).

c. Battery Negative-to-Ground Leads Removal (10901860) (A, fig. 4-8).

(1) Remove screw and two lock washers attaching ground lead terminal lug to hull (2 places).

(2) Remove two battery negative to ground leads from hull.

d. Battery-to-Circuit Breaker Lead Removal (10901835) (F, fig. 4-8).

(1) Remove lead terminal lug from battery connector.

(2) Disconnect electrical bell connector at circuit breaker and remove lead from hull.

e. Bulkhead Disconnect-to-Magnetic Clutch Lead Removal (10901856) (D, fig. 4-8).

(1) Disconnect electrical connector at bulkhead receptacle.

(2) Disconnect electrical bell connector to fuel level sending unit.

(3) Disconnect electrical connector at magnetic clutch receptacle.

(4) Remove screw and washer attaching ground lead terminal lug to hull.

(5) Remove eight screws and loop clamps attaching lead to hull and remove lead from hull.

f. Floor Disconnect-to-Bulkhead Disconnect Wiring Harness Removal (10901855) (E, fig. 4-8).

(1) Remove four screws and lock washers securing harness cover and remove cover.

(2) Remove four screws attaching bulkhead disconnect receptacle to bulkhead. Remove receptacle and gasket from bulkhead.

(3) Working from inside hull, disconnect harness electrical connector from floor connector. Remove four screws and washers attaching floor disconnect receptacle to floor, remove receptacle and gasket from floor.

(4) Remove harness from hull.

g. Hull Disconnect, Interphone Amplifier-to-Bulkhead Disconnect and Driver's Control-Box Wiring Harness (10908425) (H, fig. 4-8).

(1) Remove screw from ground lug at forward bulkhead of battery compartment.

(2) Remove four screws attaching harness receptacle to bracket disconnecto to driver's control box. Remove receptacle and gasket (S, fig. 4-8).

(3) Remove screw from ground lug.

(4) Remove four screws attaching harness receptacle to bulkhead disconnect to interphone amplifier. Remove receptacle and gasket (S, fig. 4-8).

(5) Remove harnesses from hull.

h. Battery-to-Bulkhead Disconnect Lead Removal (11592730) (N, fig. 4-8).

(1) Remove four screws and washers attaching bulkhead disconnect receptacle to bulkhead.

(2) Remove bulkhead disconnect receptacle and gasket (L, fig. 4-8) from bulkhead and remove lead from hull. Remove three covers (R, fig. 4-8).

i. Circuit Breaker-to-Bulkhead Disconnect Wiring Harness Removal (10901853) (P, fig. 4-8).

(1) Disconnect four electrical bell connectors at circuit breakers.

(2) Disconnect two electrical bell connectors at rectifier.

(3) Disconnect three electrical line bell connectors at forward bulkhead.

(4) Remove four screws and washers attaching bulkhead disconnect receptacle to forward bulkhead.

(5) Remove bulkhead disconnect receptacle and gasket (L, fig. 4-8) from bulkhead. Remove wiring harness from hull.

j. Bulkhead Disconnect-to-Voltage Control Assembly Wiring Harness Removal (10901852) (Q, fig. 4-8).

(1) Disconnect harness electrical connector from electrical receptacle at voltage regulator.

(2) Remove eight screws and washers attaching two bulkhead disconnect receptacles to forward bulkhead.

(3) Remove two bulkhead disconnect receptacles and two gaskets (L, fig. 4-7) from bulkhead.

(4) Disconnect electrical bell connector from generator indicator light lead.

(5) Remove wiring harness from hull.

k. Voltage Regulator-to-Master Relay and Accessories Panel Cable Removal (11592734 "A" Vehicles) (11675638 "B" Vehicles) (G, fig. 4-8).

(1) Remove four screws and washers attaching hull disconnect receptacle to hull bracket in bottom of turret well. Remove receptacle from bracket.

(2) Disconnect electrical connector at voltage regulator electrical receptacle.

(3) Disconnect two electrical bell connectors from voltage regulator rheostat leads ("A" vehicles).

(4) Disconnect four electrical bell connectors at circuit breakers.

(5) Remove four screws and washers attaching bulkhead disconnect receptacle to forward bulkhead. Remove receptacle and gasket from bulkhead.

(6) Remove screw and two washers attaching slave receptacle ground lead to hull.

(7) Remove screw, washer and loop clamp securing slave receptacle 24-volt lead to hull.

(8) Remove four screws and lock washers, on outside of hull, attaching slave receptacle to hull.

(9) Pull slave receptacle from hull to gain access to wiring, unsolder 24-volt lead and remove from receptacle.

(10) Remove slave receptacle, with ground lead and gasket from hull.

(11) Remove wiring harness from inside of hull.

l. Bulkhead Disconnect-to-Trailer Receptacle and Taillights Wiring Harness Removal (11592733) (J, fig. 4-8).

(1) Remove four screws and washers attaching bulkhead disconnect receptacle to forward bulkhead. Remove receptacle and gasket from bulkhead. Three electrical bell connectors were disconnected in paragraph *i*(3) above.

(2) Disconnect electrical bell connector at rear air cleaner blower motor. Harness electrical connector was disconnected from floor connector in paragraph *f*(3) above.

(3) Disconnect five electrical bell connectors at trailer receptacle.

(4) Remove five screws and connector retaining clips from hull at trailer receptacle.

(5) Disconnect three electrical bell connectors at left taillight.

(6) Remove three screws and connector retaining clips from hull at left taillight.

(7) Remove bell connectors from three left taillight leads.

(8) Pull three left taillight leads back through pipe.

(9) Remove two right taillight leads, and clips, and remove right taillight leads through pipe in same manner as paragraphs (5) through (8) above.

(10) Remove twenty-four screws, five covers and nineteen loop clamps securing harness to hull.

(11) Remove wiring harness from hull.

m. Trailer Receptacle Assembly-to-Disconnect Wiring Harness Removal (10901829) (K, fig. 4-8).

(1) Remove screw and washer attaching ground lead terminal lug to hull (2 places). Five bell connectors were disconnected in paragraph *l*(3) above.

(2) Remove screw and loop clamp securing wiring harness to hull.

(3) Remove four screws and washers, on outside of hull, attaching trailer receptacle and cover (M, fig. 4-8) to hull.

(4) Remove cover, receptacle and gasket (L, fig. 4-8) from hull, pulling leads and connectors through hole in hull.

4-51. Generator Voltage Control and Mounting Bracket Removal, "A" vehicles

Remove generator voltage control and mounting bracket. For removal procedure, refer to TM 9-2300-216-20.

4-52. Generator Voltage Regulator and Mounting Bracket Removal, "B" vehicles

Remove generator voltage regulator and mounting bracket. For removal procedures, refer to TM 9-2300-216-20.

4-53. Electrical Accessories Panel Removal

Remove electrical accessories panel. For removal procedure, refer to TM 9-2300-216-20.

4-54. Stoplight-Taillight Removal

Remove right and left stoplight-taillights. For removal procedures, refer to TM 9-2300-216-20.

4-55. Fuel Level Transmitter Removal

Remove fuel liquid quantity sending unit. For removal procedure, refer to TM 9-2300-216-20.

4-56. Fuel Cell Filler Neck and Filter Removal

Remove fuel cell filler neck and filter. For removal procedure, refer to TM 9-2300-216-20.

4-57. Fixed Fire Extinguisher System Removal

Remove fixed fire extinguisher system. Refer to TM 9-2300-216-20 for removal procedures for the following:

a. Pull cable control
b. Control tube, left and right cylinder
c. CO_2 cylinder
d. CO_2 cylinder retaining straps
e. Tubes and nozzle, left
f. Tubes and nozzle, right
g. Control valve.

4-58. Spade Hydraulic Tubes, Hoses and Fittings Removal

Remove spade hydraulic tubes, hoses and fittings. For removal procedure, refer to TM 9-2300-216-20.

4-59. Spade Control Lever and Control Valve Removal, "A" Vehicles

(Fig. 4-9).

CAUTION

Pulling the handle further than necessary will bind the retaining ring.

a. Pull and hold spade control lever away from hull for access and disconnect retaining ring from hull (A).

NOTE

At installation, make sure that ball bearing is in place and press retaining ring against shaft to aid in installing ring.

b. Pull lever and shaft off of coupling and out of hull. Remove self-locking nut and sleeve washer from end of lever and pull lever out of shaft (B). Remove flat washer, ball bearing and retaining ring from lever. Pull spring out of shaft.

c. Reach through hull back hydraulic access and remove three cap screws and lock washers securing top of control valve and manifold to hull bracket (C). Lift control valve, manifold and pressure reducing valve group out of hull.

NOTE

Observe position of control valve on manifold. The valve pressure port (marked P on flange) must aline with manifold pressure port at installation.

d. Remove cap screw and lock washer securing bottom of control valve to manifold and remove control valve (D).

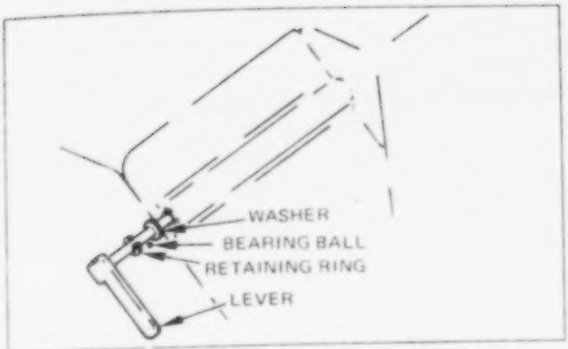
e. Remove cap screw, flat washer and lever coupling from control valve stem (E). Remove and discard four preformed packings from valve face.

f. Loosen flared nut and remove pressure reducing valve, preformed packing, backing washer, flared nut and tube union from manifold (F).

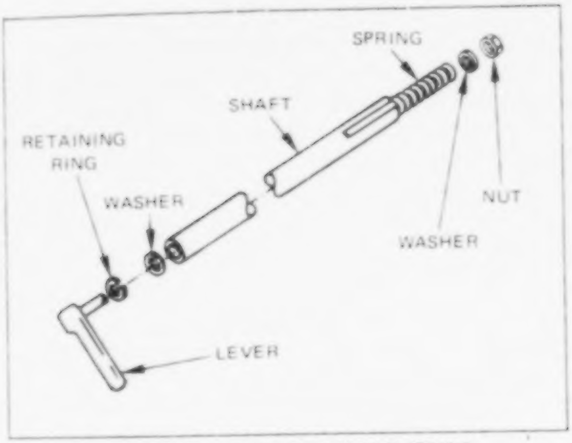
g. Remove two tube reducers and preformed packing from pressure reducing valve (F).

h. Remove two tees, two tube unions, preformed packings, flare nuts and washers from manifold (F).

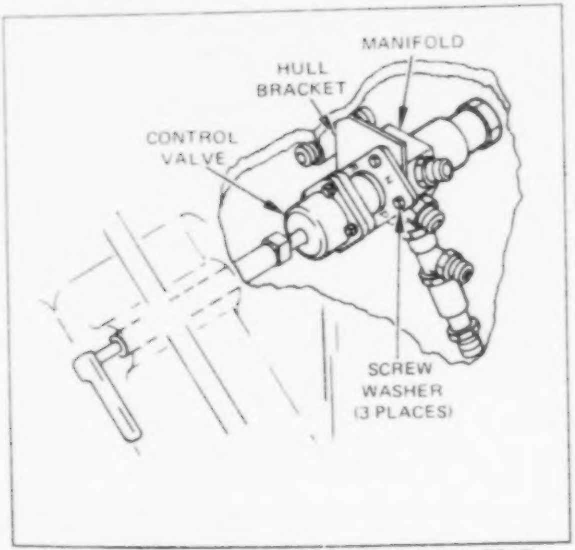
i. Remove machine plug, check valve and preformed packings from manifold (F).


WASHER
BEARING BALL
RETAINING RING
LEVER

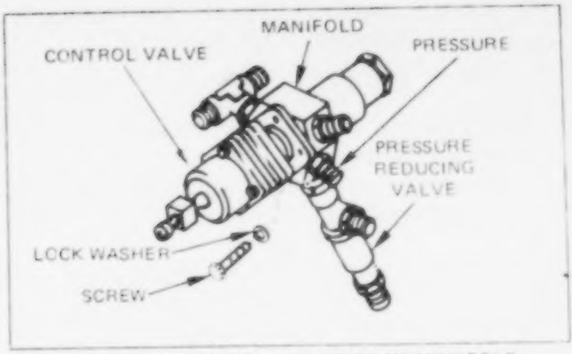
A. REMOVE SPADE CONTROL LEVER.


SPRING
SHAFT
RETAINING RING
WASHER
NUT
WASHER
LEVER

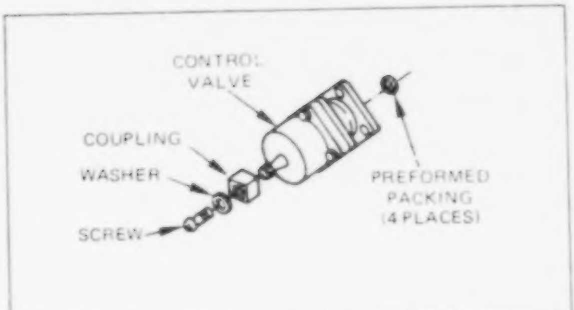
B. REMOVE LEVER SHAFT AND SPRING.


MANIFOLD
HULL BRACKET
CONTROL VALVE
SCREW
WASHER
(3 PLACES)

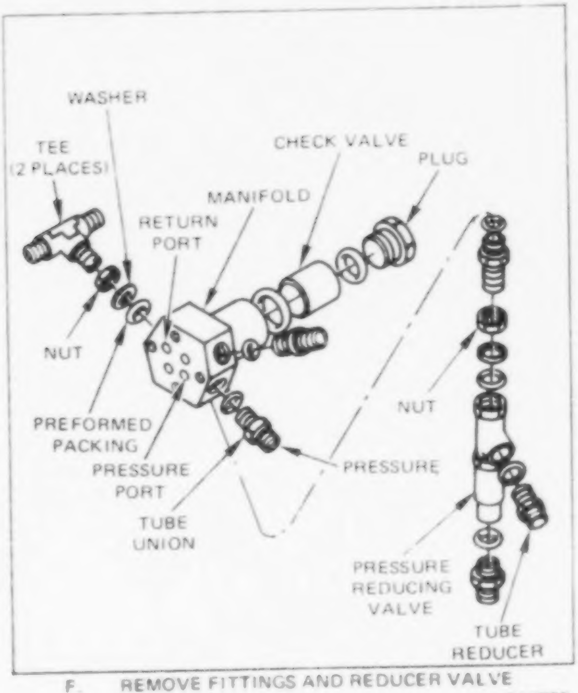
C. REMOVE CONTROL VALVES AND MANIFOLD.


MANIFOLD
CONTROL VALVE
PRESSURE
PRESSURE REDUCING VALVE
LOCK WASHER
SCREW

D. REMOVE CONTROL VALVE FROM MANIFOLD.


CONTROL VALVE
COUPLING
WASHER
SCREW
PREFORMED PACKING
(4 PLACES)

E. REMOVE COUPLING FROM CONTROL VALVE.


WASHER
TEE
(2 PLACES)
CHECK VALVE
PLUG
MANIFOLD
RETURN PORT
NUT
PREFORMED PACKING
PRESSURE PORT
TUBE UNION
NUT
PRESSURE
PRESSURE REDUCING VALVE
TUBE REDUCER

F. REMOVE FITTINGS AND REDUCER VALVE FROM MANIFOLD.

TA 011803

Figure 4-9. Spade control lever and control valve removal or installation ("A" Vehicles).

4-60. Spade Control Lever and Control Valve Removal, "B" Vehicles

(fig. 4-10).

CAUTION

> Pulling handle further than necessary will bind the retaining ring.

a. Pull and hold spade control lever away from hull for access and disconnect retaining ring from hull (A).

NOTE

> At installation, make sure ball bearing is in place and press retaining ring against shaft to aid in installing retaining ring.

b. Pull lever and shaft off coupling and out of hull. Remove self-locking nut and sleeve washer from end of lever and pull lever out of shaft (B). Remove flat washer, ball bearing and retaining ring from lever. Pull spring out of shaft.

c. Reach through hull back hydraulic access and remove two cap screws and lock washers securing manifold to hull bracket on underside of deck and lift control valve, manifold and pressure reducing valve group from hull (C).

NOTE

> The valve pressure port (marked P on flange) must aline with manifold pressure port at installation. A notch in control valve base alines with a pin in the manifold.

d. Remove four cap screws and lock washers securing control valve to manifold and remove control valve (D).

e. Remove cap screw, flat washer and lever coupling from control valve stem (E). Remove and discard four preformed packings from valve face.

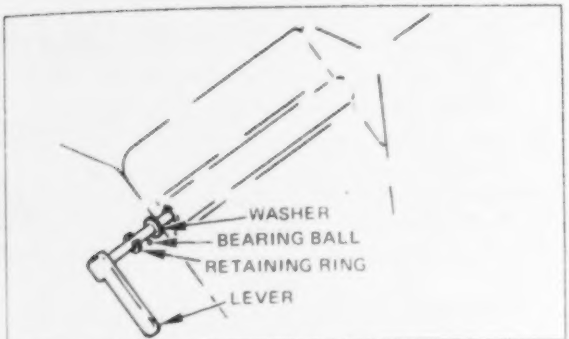
f. Loosen flared nut and remove pressure reducing valve, preformed packing, backing washer, flared nut and tube union from manifold (F).

g. Remove two tube reducers and preformed packing from pressure reducing valve (F).

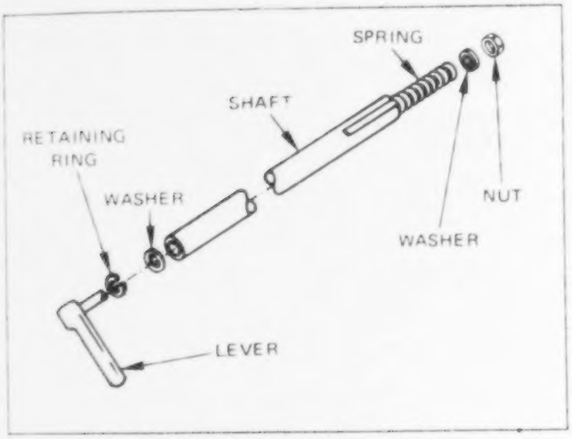
h. Remove two tees, two tube unions, preformed packings, flare nuts and washers from manifold (F).

i. Remove machine plug, check valve and preformed packings from manifold (F).

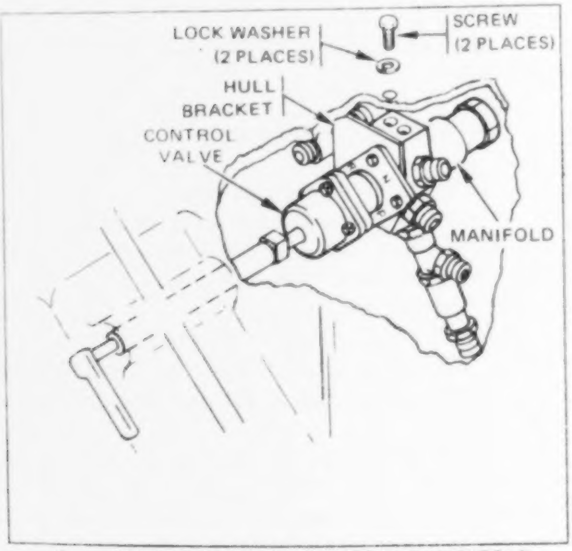
j. Remove index pin and inserts from manifold only if they are damaged (F).


WASHER
BEARING BALL
RETAINING RING
LEVER

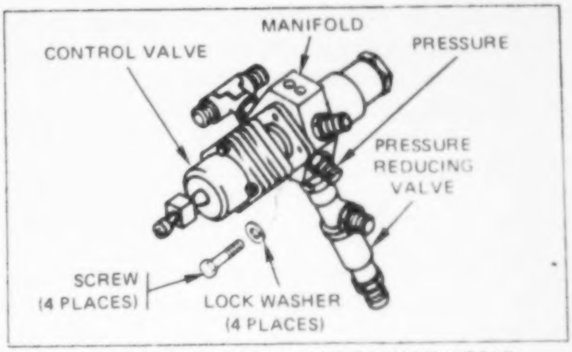
A. REMOVE SPADE CONTROL LEVER.


SPRING
SHAFT
RETAINING RING
WASHER
NUT
WASHER
LEVER

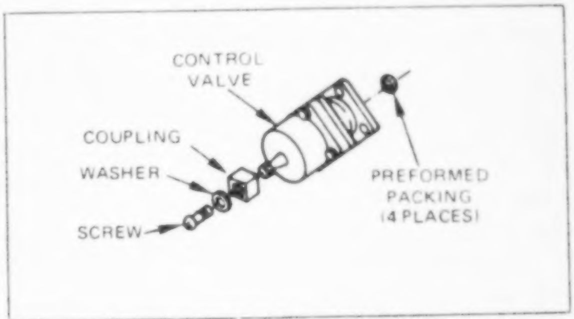
B. REMOVE LEVER SHAFT AND SPRING.


LOCK WASHER (2 PLACES)
SCREW (2 PLACES)
HULL BRACKET
CONTROL VALVE
MANIFOLD

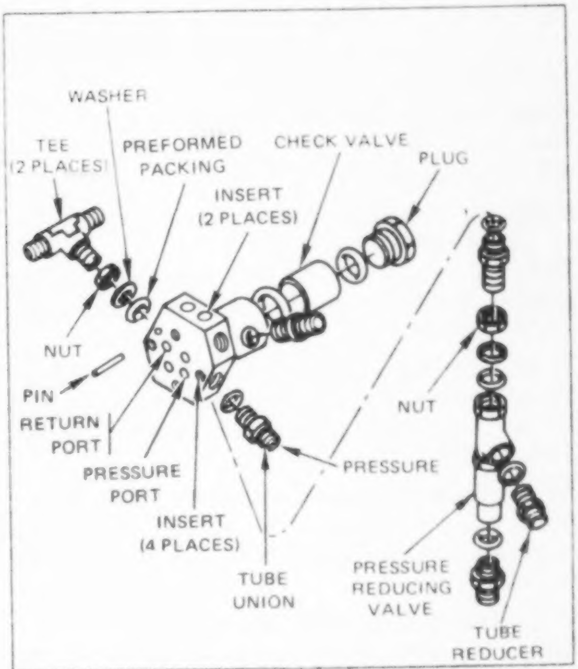
C. REMOVE CONTROL VALVES AND MANIFOLD.


MANIFOLD
CONTROL VALVE
PRESSURE
PRESSURE REDUCING VALVE
SCREW (4 PLACES)
LOCK WASHER (4 PLACES)

D. REMOVE CONTROL VALVE FROM MANIFOLD.


CONTROL VALVE
COUPLING
WASHER
SCREW
PREFORMED PACKING (4 PLACES)

E. REMOVE COUPLING FROM CONTROL VALVE.


WASHER
TEE (2 PLACES)
PREFORMED PACKING
CHECK VALVE
PLUG
INSERT (2 PLACES)
NUT
PIN
RETURN PORT
PRESSURE PORT
INSERT (4 PLACES)
TUBE UNION
NUT
PRESSURE
PRESSURE REDUCING VALVE
TUBE REDUCER

F. REMOVE FITTINGS AND REDUCER VALVE FROM MANIFOLD.

TA 030348

Figure 4-10. Spade control lever and control valve removal or installation ("B" vehicles).

4-61. Spade Shutoff Valve Removal

Remove spade shutoff valve. Refer to TM 9-2300-216-20 for removal procedures.

4-62. Suspension System Tubes, Hoses and Fittings Removal

Remove suspension lockout system tubes, hoses and fittings. For removal procedures, refer to TM 9-2300-216-20.

4-63. Lockout Cylinders Removal

Remove lockout cylinders. For removal procedure, refer to TM 9-2300-216-20.

4-64. Track Removal

Remove track. For removal procedures, refer to TM 9-2300-216-20.

4-65. Drive Sprocket and Hub Removal

Remove drive sprocket and hub on each side of hull. For removal procedure, refer to TM 9-2300-216-20.

4-66. Final Drive Removal

Remove both final drives from hull. For removal procedure, refer to TM 9-2300-216-20.

4-67. Road Wheel and Trailing Idler Wheels Removal

a. Make sure that hull is properly supported by jacks or blocking and that supports do not interfere with torsion bar retainers on underside of hull.

b. Remove ten nuts, torqued to 350-400 lb-ft, attaching each road wheel and idler wheel to hub.

c. Remove eight road wheels and two trailing idler wheels from hubs.

4-68. Torsion Bar Removal

Remove torsion bars. For removal procedure, refer to TM 9-2300-216-20.

4-69. Torsion Bar Anchor Socket and Retainer Removal

Remove torsion bar anchor sockets and retainers (10 places). For removal procedures, refer to TM 9-2300-216-20.

4-70. Trailing Idler Arm and Hub Removal

Remove right and left trailing idler wheel arm, with hub. For removal procedure, refer to Trailing Idler Arm Removal, TM 9-2300-216-20.

4-71. Road Wheel Arm and Hub Removal

Remove eight road wheel arms, with hub. For removal procedure, refer to Road Wheel Arm Removal, TM 9-2300-216-20.

4-72. Tow Hooks Removal

Remove tow hooks. For removal procedure, refer to TM 9-2300-216-20.

4-73. Towing Pintle Removal

Remove towing pintle. For removal procedure, refer to TM 9-2300-216-20.

4-74. Fabric Fuel Cell Removal ("B" Vehicles)

a. Fuel Cell Draining.

(1) Provide suitable container for fuel (capacity 260 gal) and place under fuel cell drain plugs.

(2) Remove two drain plugs from bottom of hull and drain fuel cell. If time permits, allow 24 hours for the fuel cell to drip to remove as much fuel from the filler block as possible.

NOTE

A third drain plug is provided in bottom of hull to drain fuel cell cavity.

b. Fabric Fuel Cell Cleaning.

WARNING

Do not enter fuel cells until they have been thoroughly cleaned. Prolonged breathing of vapors can be fatal.

WARNING

Fuel cells that are not entirely free of flammable liquid, vapor or gases must not be welded or exposed to heat, flame or sparks. The use of equipment that may produce sparks, such as power sanders, chisels and chipping hammers is prohibited. Welding or other work producing heat, flame or sparks shall be preceded by removal of the fabric fuel cell and by thorough cleaning.

(1) *Materials needed.*

(*a*) Adequate source of pressurized hot water (100° to 160°F) with a hose long enough to reach vehicle top deck.

(*b*) Cleaning compound, specification P-C-444, type I, 1 pint.

(*c*) Thinner-Paint, specification TT-T-291, type I, 9 pints.

(*d*) Liquid soap.

(*e*) Adequate source of compressed air (90 to 100 psi).

(*f*) Sparkproof extension light.

(*g*) Spray gun with nozzle and connections for air and warm water. Use gun (NSN 4930-00-222-2975) from shop equipment common No. 2.

(2) *Preparation.*

(*a*) Traverse turret to left to provide a clear working area above fan well deck and right side deck.

(*b*) Drain fuel cells (*a* above). Leave drain plugs out.

(*c*) Make sure the following items are removed: fan well deck (para 4-7), two fuel cell covers and gaskets (para 4-10), fuel level transmitter (para 4-55) and fuel cell filler neck and filter (para 4-56).

(*d*) Remove fuel cell filler blocks (*c* below).

(3) *Procedure.*

(*a*) Remove as much fuel from inside fuel cells as possible with clean, absorbent, dry rags.

CAUTION

Do not enter fuel cells until all sharp objects are removed from clothing and shoes are wrapped with clean, dry rags to prevent damage to fabric fuel cells.

(*b*) Prepare cleaning solution of one part cleaning compound (P-C-444) and nine parts thinner-paint (TT-T-291). Mix well and fill spray gun cup. Attach spray gun to source of air pressure.

NOTE

Make sure drained diesel fuel has been removed from under vehicle and provision has been made for disposal of cleaning solution.

(*c*) Spray interior of fabric fuel cell with cleaning solution. Cracks will retain residual fuel. Make sure all areas of fabric fuel cells are completely covered.

(*d*) Allow cleaning solution to remain on fuel cell surface for 15 minutes minimum.

(*e*) Fill spray gun cup with a soap solution and attach spray gun to pressurized warm water at 100° to 160°F.

(*f*) Spray rinse cell interior surfaces with soap solution for at least 5 minutes, allowing rinse to drain through drain holes.

(*g*) Thoroughly spray rinse cells with clear warm water, allowing rinse to drain through drain holes.

(*h*) Thoroughly dry fuel cell interior with clean, dry, absorbent rags.

(*i*) Test fabric fuel cell interior cleanliness with 12 inches of 2 inch wide masking tape. If tape firmly adheres to cell interior surfaces, cell is clean. If tape does not adhere, repeat cleaning procedures.

c. Fabric Fuel Cell Filler Block Removal. The fabric fuel cells are filled with 25 foam filler blocks that are shaped to fit together in only one way inside the fuel cells. The filler blocks may have painted manufacturing numbers that should be disregarded. Tag and number each filler block as it is removed for easy identification for installation. The filler blocks are saturated with diesel fuel. Provide running clear water to flush eyes and sensitive skin areas that are irritated by diesel fuel. If possible, wear a one-piece clothing such as coverall, and protective cover on hands and arms.

(1) Drain fuel cells (*a* above).

WARNING

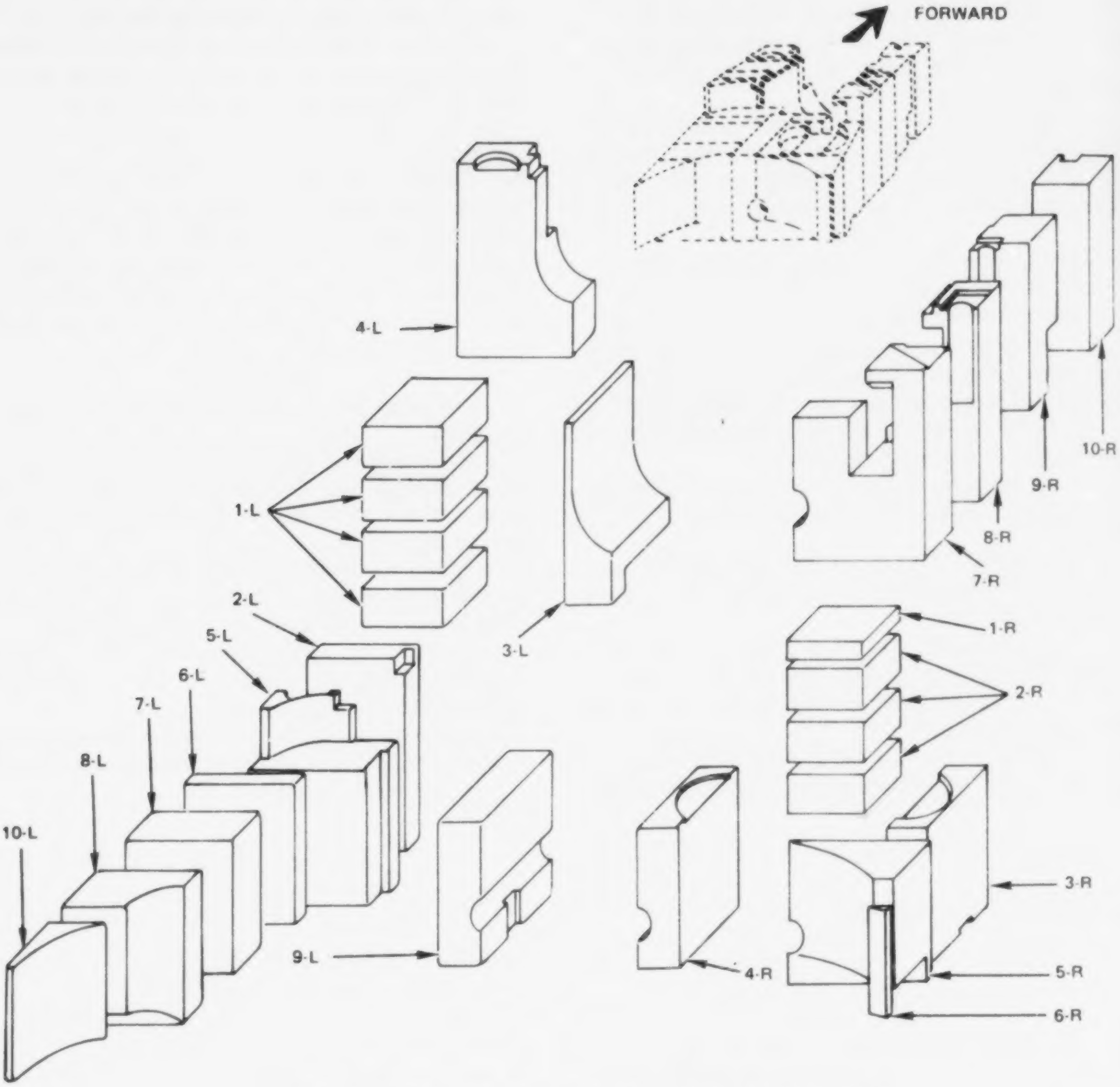
Prolonged breathing of fuel vapors can be fatal.

(2) Remove fuel level transmitter (para 4-55), fuel cell filler neck and filter (para 4-56), fan well deck (para 4-7) and two fuel cell access covers and gaskets (para 4-10).

(3) Provide metal container or large drip pan to hold filler blocks and catch dripping diesel fuel. Allow filler blocks to drain for a minimum of 24 hours.

(4) Start at right fuel access cover opening. Remove and tag filler blocks in sequence 1-R through 10-R as shown in figure 4-11.

(5) Start at left fuel cell access cover opening. Remove and tag filler blocks in sequence 1-L through 10-L as shown on figure 4-11.


FORWARD
4-L
1-L
3-L
2-L
5-L
6-L
7-L
8-L
10-L
9-L
10-R
9-R
8-R
7-R
1-R
2-R
3-R
4-R
5-R
6-R

FABRIC FUEL CELL FILLER BLOCKS PART NUMBER IDENTIFICATION.

BLOCK	PART NUMBER	BLOCK	PART NUMBER
1-L	11675607	1-R	11675620
2-L	11675624	2-R	11675621
3-L	11675606	3-R	11675617
4-L	11675605	4-R	11675616
5-L	11675622	5-R	11675618
6-L	11675610	6-R	11675619
7-L	11675609	7-R	11675615
8-L	11675623	8-R	11675614
9-L	11675608	9-R	11675613
10-L	11675611	10-R	11675612

TA 030277

Figure 4-11. Fabric fuel cell filler blocks removal or installation ("B" vehicles).

d. Right Hand Fabric Fuel Cell Removal (fig. 4-12).

(1) Remove fuel cell filler blocks (*c* above).

(2) Clean fabric fuel cells (*b* above).

WARNING

Do not enter fuel cells until they have been drained and thoroughly cleaned. Prolonged breathing of vapor can be fatal.

(3) Remove drain plug and packing (if reinstalled) and six screws and lock washers from bottom of hull securing fabric fuel cells to hull fuel drain areas in two places.

(4) Reach through fuel filler hole and remove ten screws and washers securing fuel cell to underside of deck.

CAUTION

Do not enter fuel cells until all sharp objects are removed from clothing and shoes are wrapped with clean, dry rags to prevent damage to fabric fuel cell.

(5) Enter right vehicle tunnel and remove six screws and lock washers securing fuel cell to coolant heater fuel intake.

(6) Enter right fuel cell and remove clamp securing coolant heater fuel hose to fuel intake tube on right side of right fuel cell and remove hose.

(7) From right fuel cell, remove eight screws and washers securing right and left fuel cells together at interconnect.

(8) Remove clamp securing right fuel cell nipple to vent tube and pull fuel cell free of vent tube.

(9) Remove clamp securing right fuel cell nipple to fuel intake tube and pull fuel cell free of fitting.

(10) Remove two socket head screws securing right fuel cell to right access hole.

CAUTION

Do not cut or damage fuel cell when separating cell from hull.

(11) The fuel cells are sealed with sealant at hull attaching points. Use putty knife or dull screwdriver and separate right fuel cell from hull at fuel filter access, fuel level transmitter access and coolant heater fuel intake. Pull fuel cell down and free of intake tube. Fold fuel cell down and roll back to gain access to fuel cell drain and separate fuel cell from hull with putty knife.

(12) Fold and remove right fuel cell from hull through access opening.

e. Left Hand Fabric Fuel Cell Removal (fig. 4-12).

(1) Remove right hand fuel cell (*d* above).

(2) Remove clamp securing left fuel cell nipple to vent tube and pull fuel cell free of vent tube.

(3) Remove clamp securing left fuel cell to fuel return adapter and pull cell free of adapter.

(4) Remove two socket head screws securing fuel cell to left access hole.

(5) Use putty knife or dull screwdriver and separate left fuel cell from access opening. Fold fuel cell down and roll back to gain access to fuel cell drain and separate fuel cell from hull.

(6) Fold and remove left fuel cell from hull through access opening.

(7) If required to clean hull fuel cell, remove vent tube through left fuel cell access hole. Remove left rear support, right rear support, left bottom support, right bottom support, return fuel tube adapter and two clamps, hose clamps and tube from heater fuel intake tube. Plug or cap fuel tube.

(8) Clean hull fuel cell (para 22-3*b*).

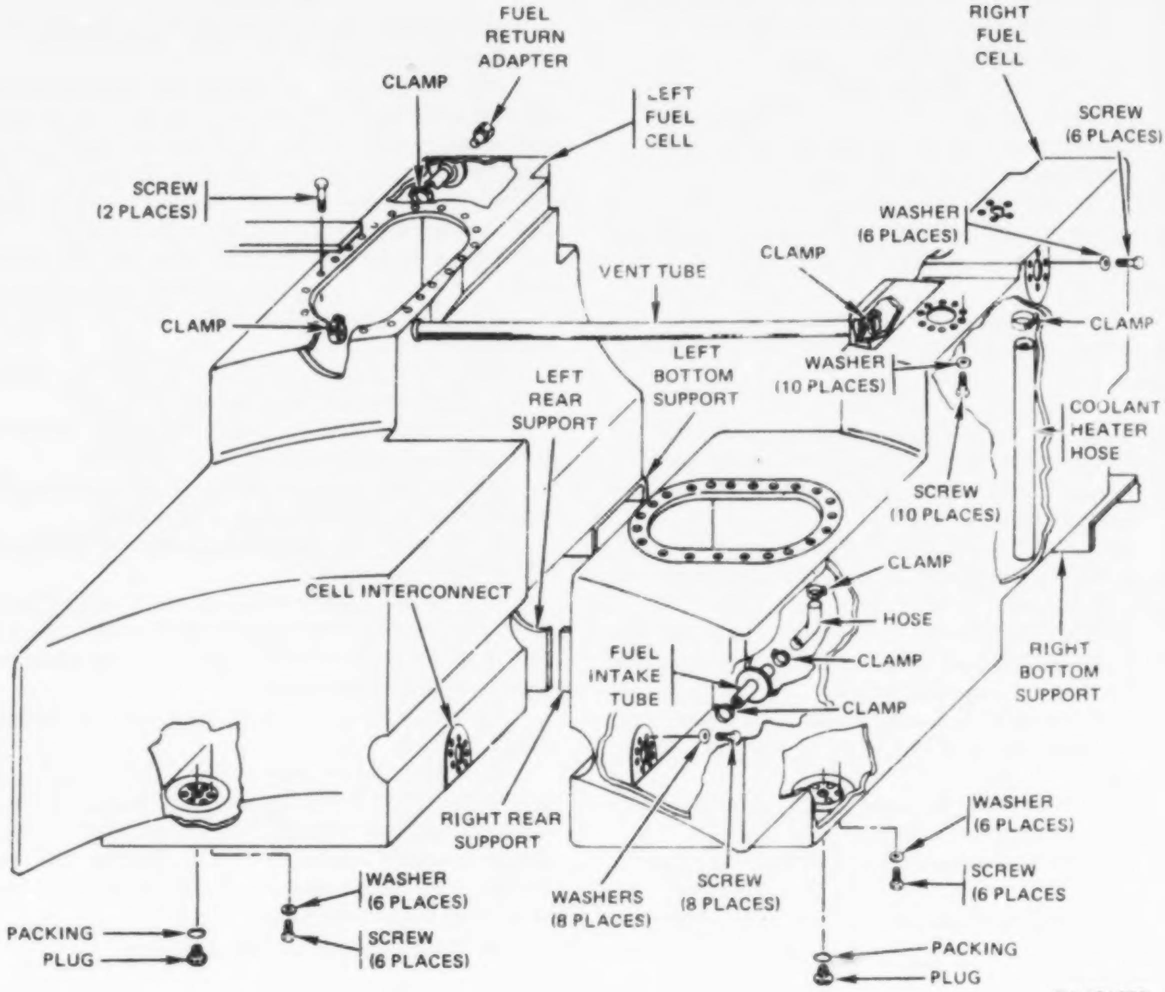

FUEL RETURN ADAPTER
CLAMP
LEFT FUEL CELL
RIGHT FUEL CELL
SCREW (6 PLACES)
SCREW (2 PLACES)
WASHER (6 PLACES)
CLAMP
VENT TUBE
CLAMP
CLAMP
LEFT BOTTOM SUPPORT
LEFT REAR SUPPORT
WASHER (10 PLACES)
COOLANT HEATER HOSE
SCREW (10 PLACES)
CLAMP
CELL INTERCONNECT
HOSE
FUEL INTAKE TUBE
CLAMP
CLAMP
RIGHT BOTTOM SUPPORT
RIGHT REAR SUPPORT
WASHER (6 PLACES)
SCREW (6 PLACES
WASHER (6 PLACES)
WASHERS (8 PLACES)
SCREW (8 PLACES)
PACKING
PLUG
SCREW (6 PLACES)
PACKING
PLUG
TA 030278

Figure 4-12. Fabric fuel cells diagram ("B" vehicles).

Section II. ASSEMBLY OF VEHICLE FROM MAJOR COMPONENTS

4-75. General

This section contains information for the guidance of personnel performing major repair work on the M107 Gun Vehicle and M110 Howitzer Vehicle. It provides an assembly line procedure for the assembly of the vehicle from major components.

4-76. Preparation for Assembly of Vehicle

a. Make sure that hull, cab and all parts are cleaned as thoroughly as is practical prior to assembly.

b. Make sure that tools and spare parts are readily available for assembly of vehicle. Provide covers, tarpaulins, lines, plugs and any other material that may be required for protection of the vehicle and exposed components until assembly is completed.

c. Provide hoisting or lifting equipment for heavy components.

d. Sufficient personnel shall be available and they shall be briefed on their duties before work is started. Provide personnel with protective equipment as may be required, such as gloves, goggles, etc.

4-77. Fabric Fuel Cells Installation and Test ("B" Vehicles)

a. Fabric Fuel Cells Installation (fig. 4-13).

(1) Make sure hull fuel cell is clean and all debris and sharp objects have been removed. Refer to para 22-3*b* for hull fuel cell cleaning.

(2) Locate fuel return tube on forward hull bulkhead under left fuel access hole. Clean and coat threads with sealing compound grade C or CV (MIL-S-22473). Install adapter on fuel return tube and

tighten securely (A).

(3) Install fabric fuel cell left support in left fuel cell over supply tube (B). Elevate inboard side of support when inserting to facilitate positioning. Install fabric fuel cell right support in right fuel cell in same manner.

(4) Install fuel intake tube and connect to fuel supply tube with hose and two clamps (C). Tighten clamps securely.

(5) Install fuel cell right rear support and make sure fuel intake tube extends through support. Install fuel cell left rear support (D).

(6) Fold right fabric fuel cell and insert forward part into right fuel cell access hole (E). Turn fabric fuel cell to install mounting ring through right access hole.

(7) Install remainder of fabric fuel cell through right access hole and unfold inside fuel cell as much as possible.

CAUTION

Apply RTV sealing compound only in a well ventilated area. Keep away from heat sparks and open flame.

NOTE

RTV sealing compound (MIL-A-46101) should cure until a skin coat is formed before mating surfaces are placed together. After installation is complete, tighten screws to torque specifications. A minimum of 6 hours cure time should be allowed before fueling. Take care not to apply RTV on tube connections.

CAUTION

Do not enter fuel cell until all sharp objects are removed from clothing and shoes are wrapped with clean, dry rags to prevent damage to fabric fuel cell.

(8) Enter fuel cell and smooth out all areas of fabric fuel cell to contours of hull fuel cell.

(9) Fold down forward right side of fuel cell. Clean mating surfaces and apply a liberal amount of adhesive sealant RTV (MIL-A-46106, type I) to mating surfaces of fabric fuel cell nut ring and hull at coolant heater fuel intake and allow to skin. Slide fuel cell over bent tube and press against hull. Enter vehicle right side tunnel. Apply sealing compound C or CV (MIL-S-22473) to screw threads and secure fabric fuel cell nut ring to hull with six lock washers and screws. Hand tighten screws. Install heater fuel intake hose on vent tube end and secure with clamp (F).

(10) Clean mating surfaces and apply a liberal amount of adhesive sealant RTV (MIL-A-46106, type I) to mating surfaces of access cover ring and fabric fuel cell nut ring and allow to skin. Secure fabric fuel cell nut ring to right access cover ring with two socket head screws through odd spaced holes offset from centerline. Hand tighten screws (G).

(11) Continue to smooth out all areas of fabric fuel cell. Work fabric fuel cell nipple over fuel intake tube until tube protrudes through nipple and secure with clamp (G).

(12) Clean mating surfaces and apply a liberal amount of adhesive sealant RTV (MIL-A-46106, type I) to mating surfaces of fuel filler bolting ring and underside of hull at fuel filler access and allow to skin. Apply sealing compound C or CV (MIL-S-22473) to screws and secure fabric fuel cell to hull with ten flat washers and screws installed through fuel cell into underside of hull (H). Hand tighten screws. Fill top of ten mounting screw holes with sealing compound.

(13) Aline fuel cell drain nut ring with hull and hold in place with one screw with only one or two thread engagement. While fuel cell is lifted from inside, work from underside of hull and apply a liberal amount of adhesive sealant RTV (MIL-A-46106, type I) to mating surfaces of fabric fuel cell nut ring and inside of hull at fuel drain ring and allow to skin. Apply sealing compound C or CV (MIL-S-22473) to screws and secure fabric fuel cell nut ring to hull with six lock washers and screws. Hand tighten screws. Install packing and drain plug in hull drain (I).

(14) Lightly lubricate crossover vent tube with grease (GAA) and install from left fuel cell access hole through hull vent tube (J). As tube projects into hull cell, work right hand fabric fuel cell nipple over tube until crossover vent tube protrudes through nipple. Pull crossover vent tube through right fuel cell nipple until left end of crossover tube is nearly flush to hull tube left side. Do not clamp crossover vent tube to right fabric fuel cell nipple at this time.

(15) Fold left fabric fuel cell and insert forward part into left fuel cell access hole (K). Turn fabric fuel cell to install nut ring through left access hole.

(16) Install remainder of fabric fuel cell through left access hole and unfold inside fuel cell as much as possible.

CAUTION

Do not enter fuel cell until all sharp objects are removed from clothing and shoes are wrapped in clean, dry rags to prevent damage to fabric fuel cell.

(17) Temporarily secure fabric fuel cell nut plate to left access cover ring with two socket head screws. Enter fuel cell and smooth out all areas of fabric fuel cell to contour of hull fuel cell.

(18) Remove two socket head screws securing fabric fuel cell to left access cover ring and pull fuel cell away from left fuel cell. Apply a liberal amount of adhesive sealant RTV (MIL-A-46106, type I) to mating surfaces of left and right fabric fuel cell interconnecting nut plates and allow to skin. From inside right fabric fuel cell, apply sealing compound C or CV (MIL-S-22473) to screws and secure interconnecting nut plates with eight lock washers and screws. Hand

tighten screws (L).

(19) Clean mating surfaces and apply a liberal amount of adhesive sealant RTV (MIL-A-46106, type I) to mating surfaces of access cover ring and fabric fuel cell nut ring and allow to skin. Secure fabric fuel cell nut ring to right access cover ring with two socket head screws through odd spaced holes offset from centerline in same manner as right fuel cell (G). Hand tighten screws.

(20) Aline fuel cell drain nut ring with hull drain and hold in place with one screw with only one or two thread engagement. While fuel cell is lifted from inside, work from underside of hull and apply a liberal amount of adhesive sealant RTV (MIL-A-46106, type I) to mating surfaces of fabric fuel cell nut ring and inside of hull at fuel drain ring and allow to skin. Apply sealing compound C or CV (MIL-S-22473) to screws and secure fabric fuel cell nut ring to hull with six lock washers and screws. Hand tighten screws. Install packing and drain plug in hull drain (I).

(21) From inside right fabric fuel cell, push crossover vent tube toward left fabric fuel cell. Work fabric fuel cell nipple over vent tube until tube is evenly spaced in both fuel cells. Secure crossover vent tube to right and left fabric fuel cell nipples with clamps (M).

(22) Under left fuel cell access hole, work fabric fuel cell over fuel return tube adapter and extend tube through fabric fuel cell nipple. Secure nipple with clamp (N).

(23) Torque the following screws to 70-74 lb in.

(*a*) Ten fuel filler bolting ring screws.

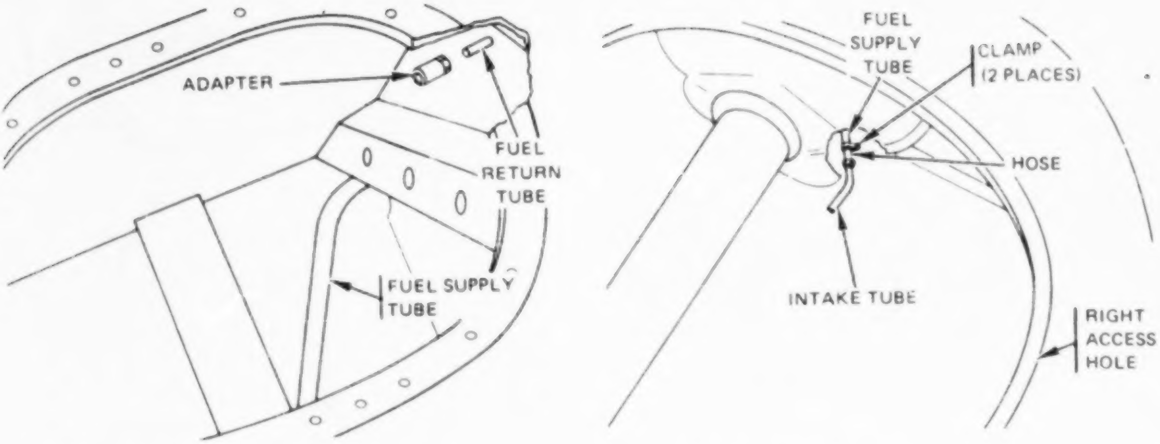
(*b*) Six coolant heater fuel intake nut ring screws.

(*c*) Six right fuel cell drain nut ring screws.

(*d*) Six left fuel cell drain nut ring screws.

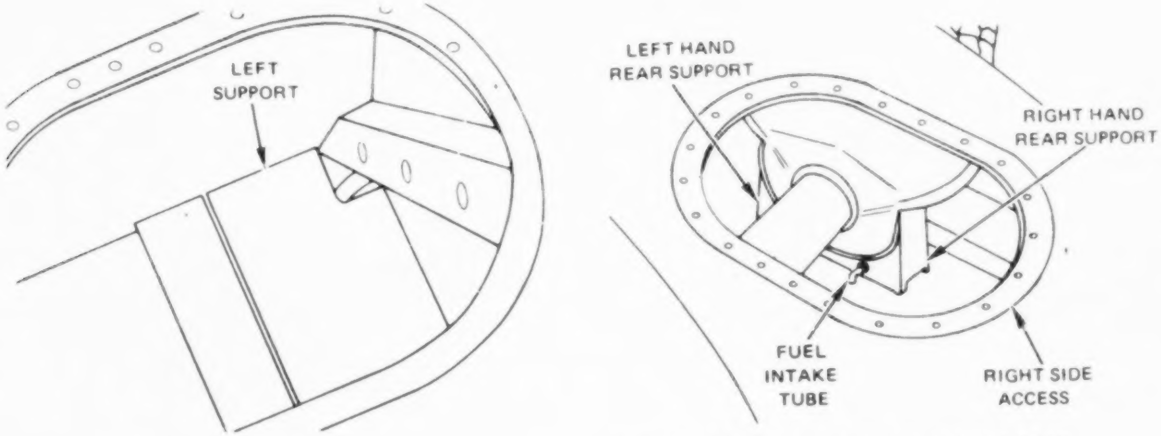
(*e*) Eight right and left fabric fuel cell interconnecting nut plate screws.

(24) Make sure all clamps have been securely tightened.


ADAPTER
FUEL RETURN TUBE
FUEL SUPPLY TUBE
FUEL SUPPLY TUBE
CLAMP (2 PLACES)
HOSE
INTAKE TUBE
RIGHT ACCESS HOLE

A. INSTALL FUEL RETURN TUBE ADAPTER.

C. INSTALL FUEL INTAKE TUBE

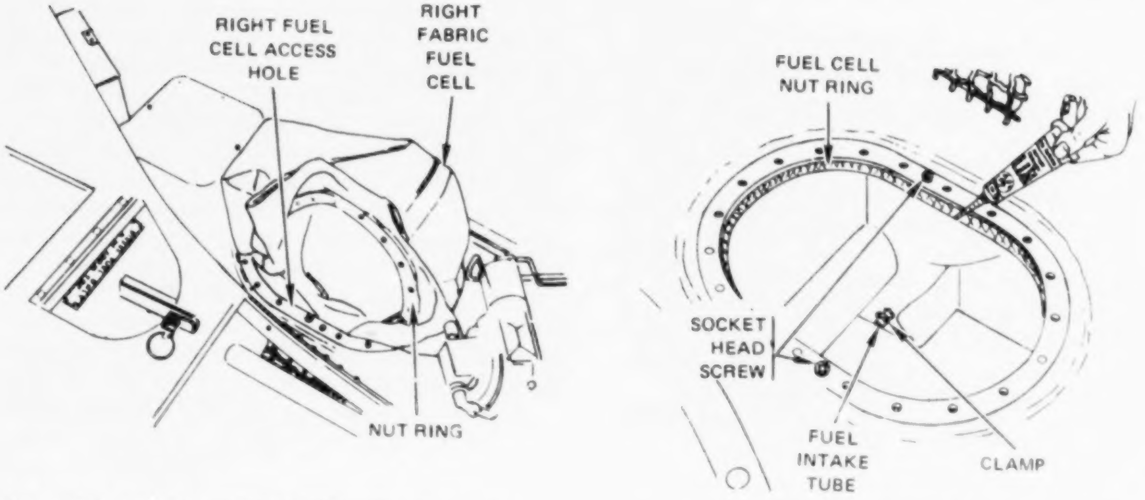

LEFT SUPPORT
LEFT HAND REAR SUPPORT
RIGHT HAND REAR SUPPORT
FUEL INTAKE TUBE
RIGHT SIDE ACCESS

B. INSTALL FUEL CELL LEFT SUPPORT.

D. INSTALL LEFT HAND AND RIGHT HAND REAR FUEL CELL SUPPORTS.

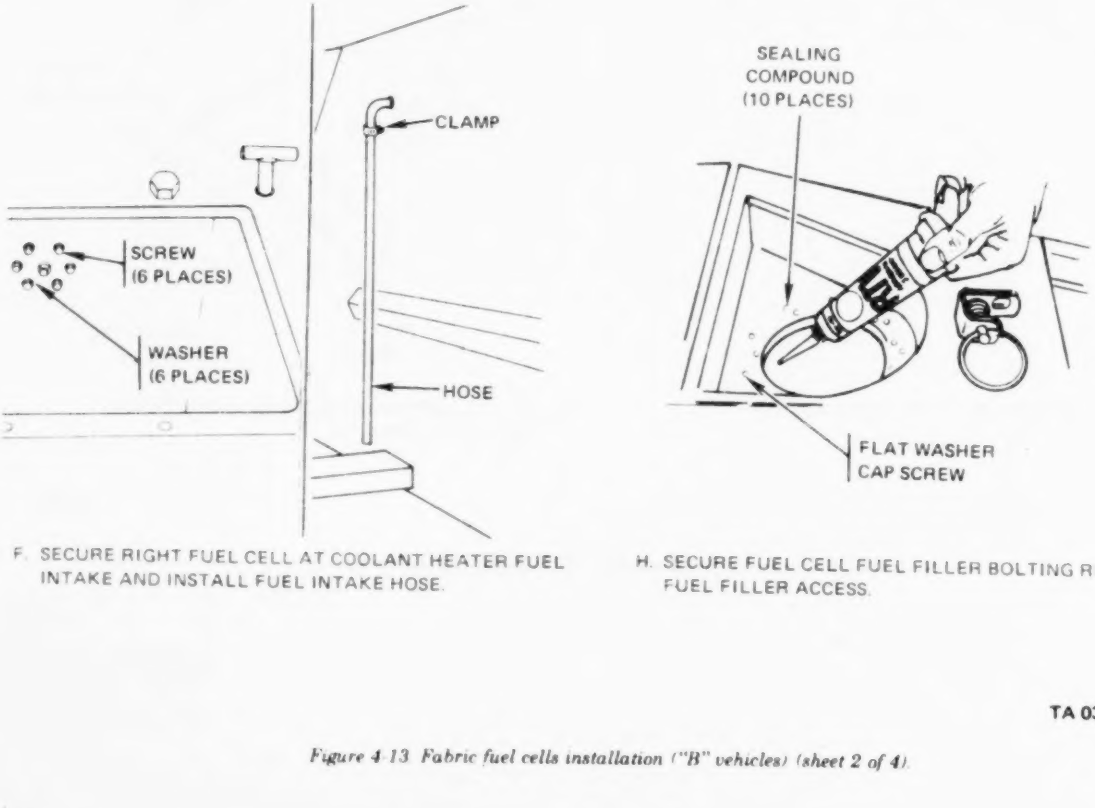
TA 030281

Figure 4-13. Fabric fuel cells installation ("B" vehicles) (sheet 1 of 4).


RIGHT FUEL CELL ACCESS HOLE
RIGHT FABRIC FUEL CELL
NUT RING
FUEL CELL NUT RING
SOCKET HEAD SCREW
FUEL INTAKE TUBE
CLAMP

E. INSTALL FOLDED RIGHT FABRIC FUEL CELL INTO FUEL CELL.

G. SECURE FUEL CELL MOUNTING RING TO HULL AND FUEL CELL TO FUEL INTAKE TUBE.

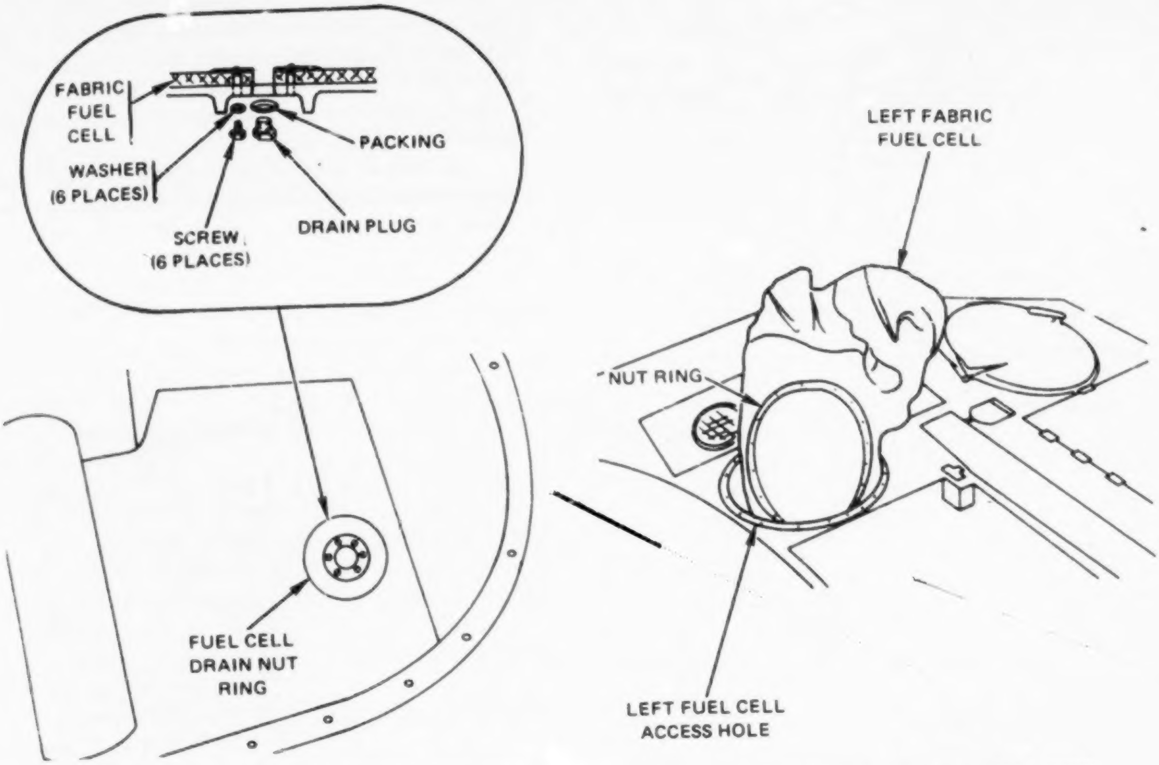

CLAMP
SCREW (6 PLACES)
WASHER (6 PLACES)
HOSE
SEALING COMPOUND (10 PLACES)
FLAT WASHER
CAP SCREW

F. SECURE RIGHT FUEL CELL AT COOLANT HEATER FUEL INTAKE AND INSTALL FUEL INTAKE HOSE.

H. SECURE FUEL CELL FUEL FILLER BOLTING RING TO FUEL FILLER ACCESS.

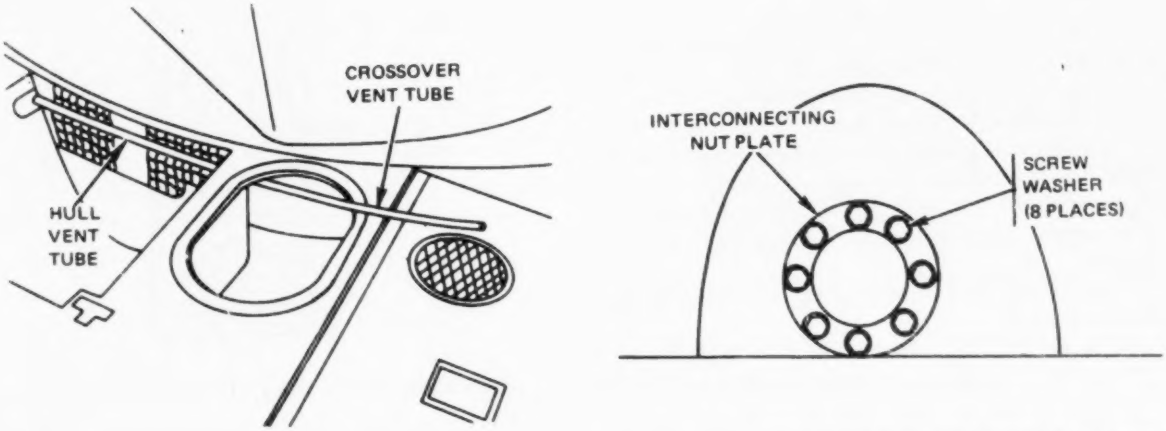
TA 030290

Figure 4-13. Fabric fuel cells installation ("B" vehicles) (sheet 2 of 4).


FABRIC
FUEL
CELL
WASHER
(6 PLACES)
SCREW
(6 PLACES)
PACKING
DRAIN PLUG
FUEL CELL
DRAIN NUT
RING
LEFT FABRIC
FUEL CELL
NUT RING
LEFT FUEL CELL
ACCESS HOLE

I. SECURE FUEL CELL DRAIN NUT RING TO HULL DRAIN.

K. INSTALL FOLDED LEFT FABRIC FUEL CELL INTO FUEL CELL.

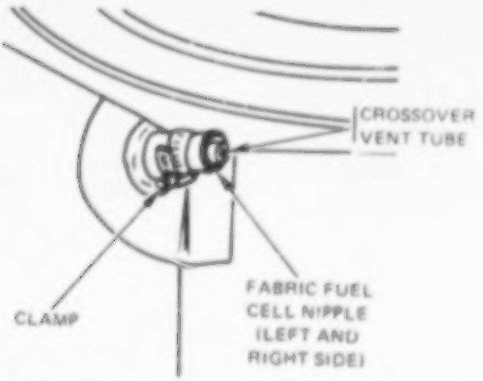

CROSSOVER
VENT TUBE
HULL
VENT
TUBE
INTERCONNECTING
NUT PLATE
SCREW
WASHER
(8 PLACES)

J. INSTALL CROSSOVER VENT TUBE IN HULL VENT TUBE.

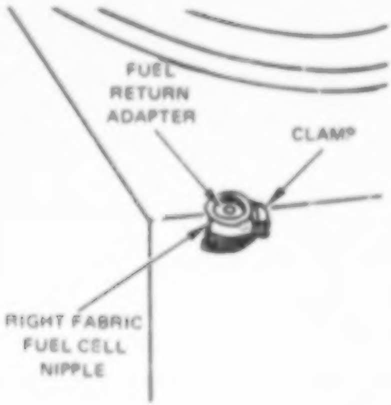
L. RIGHT AND LEFT FABRIC FUEL CELL INTERCONNECTING NUT PLATE.

TA 030296

Figure 4-13. Fabric fuel cells installation ("B" vehicles) (sheet 3 of 4).



M. CROSSOVER VENT TUBE



N. FUEL RETURN ADAPTER CLAMP

TA 030297

Figure 4-13. Fabric fuel cells installation ("B" vehicles) (sheet 4 of 4).

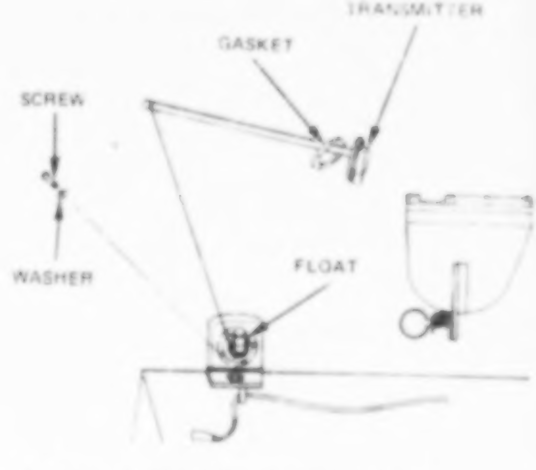
b. Fabric Fuel Cell Filler Blocks Installation. The fuel cell filler blocks support the fabric fuel cell in areas where it is not attached to the hull. Make sure each filler block is completely and firmly installed into place before installing next filler block. Assembling the filler blocks together, as shown in figure 4-11, in an open area prior to installation will facilitate identification, location, orientation and installation of the filler blocks.

(1) Install filler block (10-R) into front of right fabric fuel cell.

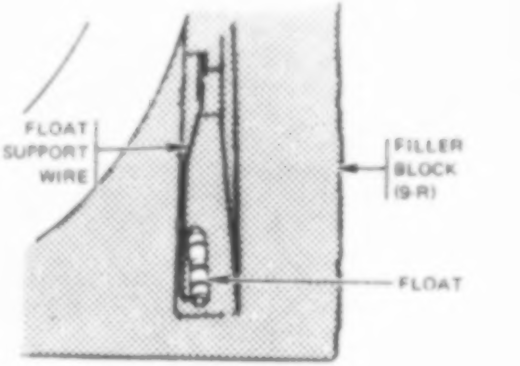
(2) Install filler block (9-R) into front of right fabric fuel cell. Make sure coolant heater fuel intake hose is in filler block slot.

(3) Install liquid quantity transmitter. Apply a liberal amount of adhesive sealant RTV (MIL-A-46106, type I) to mating surfaces of fabric fuel cell and under side of liquid quantity transmitter hull mounting and allow to skin. Install gasket on transmitter and insert float into mounting hole with float support wire positioned in notch (A, fig. 4-14). Lower float into mounting hole and install transmitter. Turn s electrical receptacle is inboard. Aline holes in fabri fuel cell nut plate, hull mounting holes and transmitter. Apply sealing compound C or CV (MIL-S-22473) t threads and secure transmitter and fuel cell nut plat to hull with five lock washers and five screws. Torqu screws to 20-30 lb in.

(4) Adjust filler block (9-R) until liquid quantit transmitter float has complete freedom of movement i block (B, fig. 4-14).



A. INSTALL LIQUID QUANTITY TRANSMITTER



B. LIQUID QUANTITY TRANSMITTER FLOAT CLEARANCE

TA 030306

Figure 4-14. Liquid quantity transmitter installation ("B" vehicles).

(5) Install filler block (8-R) into forward part of right fabric fuel cell. Aline cutout with fuel filler hole to allow installation of filler neck and filter.

(6) Install fuel cell filter and cap (A, fig. 4-15). Install gasket on fuel filler filter and insert into hull and

fuel cell opening. Install washer, gasket, and cap ring. Apply sealing compound C or CV (MIL-S-22473) to screws, aline holes and secure all units to hull with six lock washers and cap screws. Tighten screws securely. Thread retaining ring through cap chain and install ring in cap ring. Install cap.

(7) Adjust filler block (8-R) (B, fig. 4-15) to fit around filter evenly.

(8) Install filler block (7-R) into forward part of right fabric fuel cell.

(9) Install filler block (6-R) into right rear corner of right fabric fuel cell.

(10) Install filler block (5-R) into rear part of right fabric fuel cell.

(11) Install filler block (4-R) into inboard side of right fabric fuel cell.

(12) Install filler block (3-R) into outboard side of right fabric fuel cell.

(13) Install three filler blocks (2-R), one on top of the other, into bottom of right fabric fuel cell.

(14) Install filler block (1-R) into right fabric fuel cell on top of filler block (2-R).

(15) Install filler block (10-L) into rear corner of left fabric fuel cell.

(16) Install filler block (9-L) into rear inboard side of left fabric fuel cell.

(17) Install filler block (8-L) into rear outboard side of left fabric fuel cell.

(18) Install filler block (7-L) into rear outboard side of left fabric fuel cell.

(19) Install filler block (6-L) into rear of left fabric fuel cell.

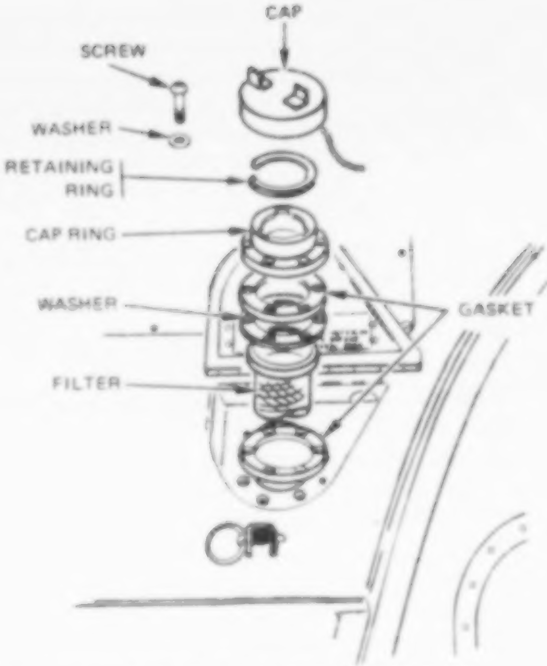
(20) Install filler block (5-L) into rear of left fabric fuel cell.

(21) Install filler block (4-L) into front of left fabric fuel cell.

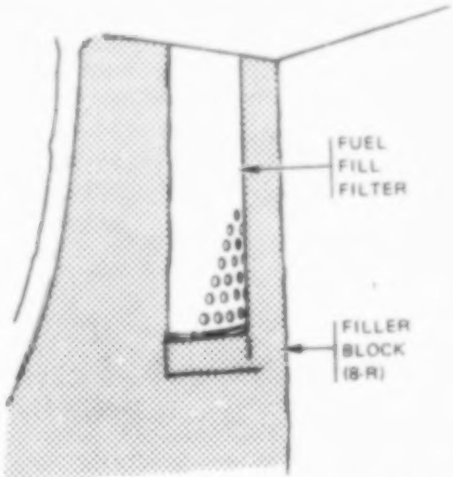
(22) Install filler block (3-L) into inboard side of left fabric fuel cell.

(23) Install filler block (2-L) into rear of left fabric fuel cell.

(24) Install four filler blocks (1-L), one on top of the other, into bottom of left fabric fuel cell.



A. INSTALL FUEL CELL FILLER FILTER AND CAP



B. INSTALL FUEL FILL FILTER AND CHECK FIT IN BLOCK

TA 030306

Figure 4-15. Fuel cell filler filter and cap installation ("B" vehicles)

c. Hull Covers and Deck Installation.

(1) Remove two socket head screws securing right fabric fuel cell nut ring to access cover ring. Install fuel cell access cover gasket on mounting ring. Apply sealing compound C or CV (MIL-S-22473) to screw threads and secure fabric fuel cell nut ring to access cover ring by reinstalling two socket head screws. Torque screws to 70-74 lb in. Repeat procedure above for left fabric fuel cell gasket.

(2) Install fuel cell access cover on right fuel cell. Apply sealing compound C or CV (MIL-S-22473) on screw threads and secure fuel cell access cover and fuel cell nut ring to hull with 20 lock washers and cap screws. Torque screws to 120-130 lb in.

(3) Install fan well deck and hull access cover on top of right side of vehicle.

d. Fabric Fuel Cell Test (fig. 4-16).

(1) Remove fuel filler cap and turn cap vent valve, on underside of cap, to closed position. Replace cap and tighten.

(2) Remove coolant heater fuel intake line plug on right side of fuel cell. Install nipple into fuel intake line. Connect hose to nipple. Install 0—10 psi pressure gage, pressure regulator valve and shutoff valve to hose. Connect shutoff valve to compressed air sourc

(3) Set pressure regulator valve to 3 psi. Pressuri fuel cell to 2 psi + 1 psi for 5 minutes minimum a observe gage for any pressure drop.

(4) Check for air leakage with soap soluti brushed on all joints and screws at right and left acce covers, fuel level transmitter, fuel filler neck, two fu cell drain plugs, coolant heater fuel intake and at fu supply and return line quick disconnects. Tighten a taching screws, if required, to stop leaks. No leakage i permissible. If leakage cannot be stopped by tightenin screws, disassemble the fuel cell to the extent nece sary to reseal leaking area with RTV and/or CV.

CAUTION

Depressurize fuel cell before removing fuel filler cap.

(5) Depressurize fuel cell and remove pressure te equipment. Install plug in coolant heater fuel intake

CAUTION

Fuel filler cap vent valve must be open for engine to receive fuel.

(6) Remove fuel filler cap and turn cap vent valv on underside of cap, to vent position. Replace cap.

(7) Allow a minimum of six hours cure time fo sealants, then fill fuel cell with fuel.

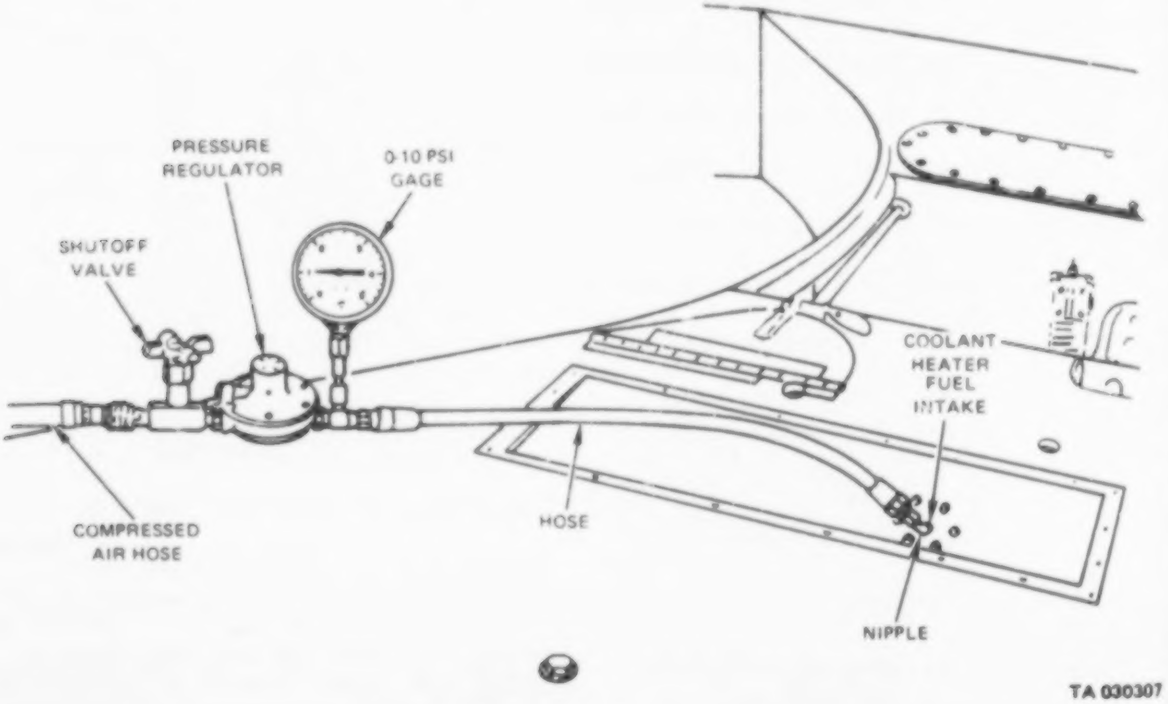


Figure 4-16. Fabric fuel cells test ("B" vehicles).

4-78. Towing Pintle Installation

Install towing pintle. For installation procedure, refer to TM 9-2300-216-20.

4-79. Tow Hooks Installation

Install tow hooks. For installation procedure, refer to TM 9-2300-216-20.

4-80. Lockout Cylinders Installation

Install lockout cylinders. For installation procedure, refer to TM 9-2300-216-20.

4-81. Road Wheel Arm and Hub Installation

Install eight road wheel arms with hub. For installation procedure, refer to Road Wheel Arm Installation, TM 9-2300-216-20.

4-82. Trailing Idler Arm and Hub Installation

Install two trailing idler arms with hubs. For installation procedure, refer to Trailing Idler Arm Installation TM 9-2300-216-20.

4-83. Torsion Bar Anchor Socket and Retainer Installation

Install torsion bar anchor sockets and retainers (10 places). For installation procedure, refer to TM 9-2300-216-20.

4-84. Torsion Bar Installation

Install torsion bars (10 places). For installation procedure, refer to TM 9-2300-216-20.

4-85. Road Wheels and Trailing Idler Wheels Installation

Install road wheels and trailing idler wheels. Installation is the reverse of removal (para 4-67).

4-86. Final Drive Installation

Install final drives. For installation procedure, refer to TM 9-2300-216-20.

4-87. Drive Sprocket and Hub Installation

Install drive sprocket and hub. For installation procedure, refer to TM 9-2300-216-20.

4-88. Hull Support Removal

Remove hull supports installed during disassembly.

4-89. Track Installation

Install track on vehicle. For installation procedure, refer to TM 9-2300-216-20.

4-90. Suspension System Tubes, Hoses and Fittings Installation

Install suspension system tubes, hoses and fittings. For installation procedure, refer to TM 9-2300-216-20.

4-91. Spade Hydraulic Tubes, Hoses and Fittings Installation

Install spade hydraulic tubes, hoses and fittings. For installation procedures, refer to TM 9-2300-216-20.

4-92. Spade Control Lever and Control Valve Installation, "A" Vehicles

Install the spade control in reverse order of the instructions in paragraph 4-59.

4-93. Spade Control Lever and Control Valve Installation, "B" Vehicles

Install the spade control lever and the spade control valve in the reverse order of removal (para 4-60).

4-94. Spade Shutoff Valve Installation

Install the shutoff valve. Refer to TM 9-2300-216-20 for installation procedures.

4-95. Hull Drain Valve (Turret Well) Installation

Install hull drain valve in turret well. For installation procedure, refer to TM 9-2300-216-20.

4-96. Fixed Fire Extinguisher System Installation

Install fixed fire extinguisher system. For installation procedure, refer to TM 9-2300-216-20.

4-97. Fuel Cell Filler Neck and Filter Installation

Install fuel cell filler neck and filter. For installation procedure, refer to TM 9-2300-216-20.

4-98. Fuel Level Transmitter Installation

Install fuel level transmitter. For installation procedure, refer to TM 9-2300-216-20.

4-99. Fuel Cell Sump Installation, "A" Vehicles

Install fuel cell sump in reverse order of removal (para 4-25*b*).

4-100. Stoplight-Taillight Installation

Install right and left stoplight-taillight. For installation procedure, refer to TM 9-2300-216-20.

4-101. Electrical Accessories Panel Installation

Install electrical accessories panel. For installation procedure, refer to TM 9-2300-216-20.

4-102. Generator Voltage Control and Mounting Bracket Installation, "A" Vehicles

Install generator voltage control and mounting bracket. For installation procedure, refer to TM 9-2300-216-20.

4-103. Generator Voltage Regulator and Mounting Bracket Installation, "B" Vehicles

Install generator voltage regulator and mounting bracket. For installation procedure, refer to TM 9-2300-216-20.

4-104. Forward and Aft Air Separator Blower Installation

Install forward and aft air separator blower. For installation procedure, refer to TM 9-2300-216-20.

4-105. Center and Rear Hull Wiring Harnesses and Leads Installation

(Fig. 4-8)

Install center and rear hull wiring harnesses and leads in the reverse order of removal (para 4-50).

4-106. Engine Air Intake Ducts Installation

Install engine air intake ducts. For installation procedure, refer to TM 9-2300-216-20.

4-107. Intake Air Separator Installation

Install intake air separator. For installation procedure, refer to TM 9-2300-216-20.

4-108. Master Relay Installation

Install master relay. For installation procedure, refer to TM 9-2300-216-20.

4-109. Low Coolant Level Warning Light, "B" Vehicles

Install low coolant level warning light. For installation procedure refer to TM 9-2300-216-20.

4-110. Driver's Compartment Dome Light Installation

Install driver's compartment dome light. For installation procedure, refer to TM 9-2300-216-20.

4-111. Dimmer Switch and Dimmer Switch Bracket Installation

Install dimmer switch and dimmer switch bracket. For installation procedure, refer to TM 9-2300-216-20.

4-112. Warning Horn and Circuit Breaker Mounting Plate Installation

Install warning horn and circuit breaker plate with warning horn and circuit breaker. For installation procedure, refer to TM 9-2300-216-20.

4-113. Instrument (Switch) Panel Installation

Install instrument (switch) panel. For installation procedure for instrument (switch) panel, switches, and valves, refer to TM 9-2300-216-20.

4-114. Air Box Heater Control Panel Installation, "A" Vehicles

Install air box heater control panel. For installation procedure, refer to TM 9-2300-216-20.

4-115. Air Box Heater and Fuel Prime and Purge Control Panel Installation, "B" Vehicles

Install air box heater and fuel prime and purge control panel. For installation procedure, refer to TM 9-2300-216-20.

4-116. Instrument (Gage) Panel Installation

Install instrument (gage) panel. For installation procedure for instrument (gage) panel and instruments, refer to TM 9-2300-216-20.

4-117. Driver's Compartment Wiring Harnesses and Leads Installation

(Fig. 4-7)

Install driver's compartment wiring harnesses and leads in the reverse order of removal (para 4-37).

4-118. Forward Hull Wiring Harness and Leads Installation

(Fig. 4-6).

Install forward hull wiring harness, leads a headlights in the reverse order of removal (para 4-3

4-119. Tachometer and Speedomete Drive Shafts Installation

Install tachometer and speedometer drive shafts. F installation procedure, refer to TM 9-2300-216-20.

4-120. Parking Brake and Service Brak Controls and Linkage Installation

Install parking brake and service brake controls a linkage. For installation procedure, refer to T 9-2300-216-20.

4-121. Shifting Controls and Linkage Installation

Install shifting controls and linkage. For installati procedure, refer to TM 9-2300-216-20.

4-122. Throttle and Accelerator Contro Installation

Install throttle and accelerator controls. For installa tion procedure, refer to TM 9-2300-216-20.

4-123. Steering Controls and Linkage Installation

Install steering controls and linkage. For installati procedure, refer to TM 9-2300-216-20.

4-124. Hull Drain Valve (Driver's Compartment) Installation

Install hull drain valve (driver's compartment). For installation procedure, refer to TM 9-2300-216-20.

4-125. Driver's Seat and Support Post Installation

Install driver's seat and support post. For installatio procedure, refer to TM 9-2300-216-20.

4-126. Driver's Cupola Cover Installation

Install driver's cupola cover. For installation procedure, refer to TM 9-2300-216-20.

4-127. Hull Drain Valve (Power Plant Compartment) Installation

Install hull drain valve (power plant compartment For installation procedure, refer to TM 9-2300-216-2

4-128. Low Pressure Fuel Hoses, Tubes and Fittings Installation

Install low pressure fuel hoses, tubes and fittings. For installation procedure, refer to TM 9-2300-216-20.

4-129. Auxiliary Drive Shafts and Carrier Bearing Installation

Install auxiliary drive shafts and carrier bearing. For installation procedure, refer to TM 9-2300-216-20.

4-130. Hydraulic Rotary Pump, Filter, Tubes, Hoses and Fittings Installation

(Fig. 4-5)

Install hydraulic rotary pump, filter, tubes, hoses and fittings in reverse order of removal (para 4-23).

4-131. Auxiliary Drive Installation

Install auxiliary drive. For installation procedure, refer to TM 9-2300-216-20.

4-132. Generator Air Intake Ducts and Tube Axial Fan Installation

Install generator air intake duct and tube axial fan. For installation procedure, refer to TM 9-2300-216-20.

4-133. Generator and Scroll Housing Installation

Install generator and scroll housing. For installation procedure, refer to TM 9-2300-216-20.

4-134. Cooling Fan Installation

Install cooling fan. For installation procedure, refer to TM 9-2300-216-20.

4-135. Surge Tank Installation

Install surge tank. For installation procedure, refer to TM 9-2300-216-20.

4-136. Radiator Resilient Mounts Installation

Install radiator resilient mounts. For installation procedure, refer to TM 9-2300-216-20.

4-137. Radiator Installation

Install radiators. For installation procedure, refer to TM 9-2300-216-20.

4-138. Radiator Support Beam Installation

Install radiator support beam. For installation procedure, refer to TM 9-2300-216-20.

4-139. Water Tubes, Hoses and Fittings Installation

Install water tubes, hoses and fittings. For installation procedure, refer to TM 9-2300-216-20.

4-140. Engine Mount Installation

Install engine mounts. For installation procedure, refer to TM 9-2300-216-20.

4-141. Power Plant Installation

Install power plant. For installation procedure, refer to TM 9-2300-216-20.

4-142. Hull Stowage Racks, Clips and Holders Installation

(Fig. 4-4)

Install hull stowage racks, clips and holders (para 4-11). For installation procedures, refer to TM 9-2300-216-20.

4-143. Fuel Cell Access Covers Installation

(C, fig. 4-3)

a. Remove two socket head screws securing left fabric fuel cell mounting ring to access cover ring, "B" vehicles.

b. Install fuel cell access cover gasket on cover ring.

c. Apply sealing compound C or CV (MIL-S-22473) to screw threads and secure fabric fuel cell mounting ring to access cover ring by installing two socket head screws. Torque screws to 70-74 lb in, "B" vehicles.

d. Install fuel cell access cover. Apply sealing compound C or CV (MIL-S-22473) to screw threads and secure fuel cell access cover to hull with 20 lock washers and screws. Torque screws to 120-130 lb in.

e. Install right fuel cell access cover by repeating *a* through *d* above, ("B" vehicles).

4-144. Hull Covers, Doors and Plugs Installation

(Fig. 4-3)

Install hull covers, doors and plugs (para 4-9). For installation procedure, refer to TM 9-2300-216-20.

4-145. Guards, Harness Protection Plate and Fender Extensions Installation

(Fig. 4-2)

Install headlamp guards, mud guards, hose guard, harness protection plate, tube guard and fender extensions (para 4-8). For installation procedures, refer to TM 9-2300-216-20.

4-146. Hull Decks and Miscellaneous Components Installation

(Fig. 4-1)

Install hull decks miscellaneous components (para 4-7). For installation procedures, refer to TM 9-2300-216-20.

4-147. Battery and Battery Tray Installation

Install battery and battery tray. For installation procedure, refer to TM 9-2300-216-10.

4-148. Wedge Type Travel Lock Installation, "B" Vehicles

Install wedge type travel lock. For installation procedure, refer to TM 9-2300-216-20.

4-149. Spade Installation

Install spade. For installation procedure, refer to TM 9-2300-216-20.

4-150. Spade Cylinder Installation

Install spade cylinder. For installation procedure, refer to TM 9-2300-216-20.

4-151. Turret and Components Mounted on Turret Installation

Refer to TM 9-2300-216-34-2 for installation of components mounted on turret.

4-152. Cannon Mount and Loader and Rammer Installation

Install the following items in accordance with instructions in TM 9-2300-216-34-3.

a. 175-MM Gun, Cannon M113/M113A1

b. 8-Inch Gun, Cannon M2A2 and Cannon M201

c. Gun Mount M158 or Gun Mount M174

d. Equilibrator

e. Loader and Rammer Assembly

f. Loader and Rammer Stow Position Lock, "B" Vehicles

g. Loader and Rammer Ram Position Lock, "B" Vehicles.

4-153. Sighting and Fire Control Equipment Installation

Install sighting and fire control equipment. Refer to TM 9-2300-216-20 for installation procedures.

4-154. Communication Equipment Installation

Install radio sets, RF cable to antenna, antenna, loud speaker, and control boxes. For identification and location of components, refer to TM 9-2300-216-10. Coordinate installation of communication equipment with communications maintenance personnel.

4-155. Personnel Seat Installation

Install personnel seat. Refer to TM 9-2300-216-20 installation procedures.

4-156. Basic Issue Items Installation

Install all basic issue items (BII) on vehicle. For a li all basic issue items and their location on vehicle, re to TM 9-2300-216-10.

4-157. Special Purpose Kits Installation

Install special purpose kits as required. Refer Chapter 23 for installation procedures for the follow kits:

a. Winterization Kit
b. Crew Shelter Kit
c. Crew Heater Kit
d. Driver's Temperate Zone Heater Kit
e. OVE Rack Kit
f. Arctic Traction Kit

Section III. SERVICE VEHICLE

4-158. General

This section provides information for the various services that must be performed after assembly of the vehicle. The following services must be accomplished before attempting to operate the vehicle.

a. Fill engine cooling system with coolant. Check connections and hoses for leakage. Tighten connectors if required.

b. Fill turret hydraulic reservoir with hydraulic fluid (approximately 27 gallons capacity). Check suction and pressure hoses and fittings for leakage. Tighten connections if required.

c. Check oil level in transmission. Add lubricating oil if required. For filling instructions, refer to LO 9-2300-216-12.

d. Check oil level in engine. Add lubricating oil if required. For filling instructions, refer to L 9-2300-216-12.

e. Fill fuel tank with fuel. Check connections, dra plug(s) and low pressure fuel lines for leakage.

f. Check electrolyte in batteries for full charge. F procedure, refer to TM 9-2300-216-10. Charge ba teries if required.

g. Lubricate vehicle in accordance with instructio in LO 9-2300-216-12.

h. Check the nitrogen pressure in the equilibrat and in the accumulator gas bottle. For instructio refer to TM 9-2300-216-20.

i. Check the replenisher. For instructions, refer TM 9-2300-216-10.

j. Check the nitrogen pressure in the recoil mecha ism. Refer to TM 9-2300-216-34-2 for instructions.

Section IV. VEHICLE ADJUSTMENTS

4-159. General

This section provides information for adjustments to be made to the vehicle. The following adjustments must be made before operating the vehicle.

4-160. Brake Controls and Linkage Adjustment

Adjust brake controls and linkage. For adjustment procedure, refer to TM 9-2300-216-20.

4-161. Shifting Controls and Linkage Adjustment

Adjust shifting controls and linkage. For adjustment procedure, refer to TM 9-2300-216-20.

4-162. Steering Controls and Linkage Adjustment

Adjust steering controls and linkage. For adjustment procedure, refer to TM 9-2300-216-20.

4-163. Throttle Controls and Linkage Adjustment

Adjust throttle controls and linkage. For adjustme procedure, refer to TM 9-2300-216-20.

4-164. Service Headlamp Adjustment

Check and adjust alinement of service headlamps. Fo adjustment procedure, refer to TM 9-2300-216-20.

4-165. Traversing Drive Assembly Adjustment

Adjust traversing drive assembly torque lock drive. Fo adjustment procedures, refer to TM 9-2300-216-34-2

4-166. Elevating Drive Assembly Adjustment

Adjust elevating drive assembly torque lock drive. Fo adjustment procedures, refer to TM 9-2300-216-34-2

4-167. Loader and Rammer Adjustment

Adjust loader and rammer, tray and interlock switches. For adjustment procedures, refer to TM 9-2300-216-20.

4-168. Stow Position Lock and Ram Position Lock Adjustment, "B" Vehicles

Adjust stow position lock and ram position lock. For adjustment procedures, refer to TM 9-2300-216-20.

4-169. Turret Traversing Deceleration Solenoid Switch Adjustment

Adjust turret traversing deceleration solenoid switch. For adjustment procedure, refer to TM 9-2300-216-20.

Section V. FINAL INSPECTION AND ROAD TEST

4-170. General

This section provides information for the final inspection and road test of the M107 Gun Vehicle and M110/M110A1 Howitzer Vehicles. The final inspection and road test ensures the correct adjustment and functioning of all components of the vehicle. During and after road test of the vehicle, any repairs or adjustments necessary to ensure proper operation should be made. The specific inspections and tests to be performed before and during road tests are listed in table 4-2.

Table 4-2. Final Inspection and Road Test

Item to be inspected or tested	Procedure
Starting system	**CAUTION** Before starting the engine, ensure that all switches and controls are in the proper position. Do not operate starter for more than thirty seconds and then allow a three to five minute cooling off period. Purge and prime fuel system per instructions in TM 9-2300-216-10 ("B" vehicles). Start engine by pressing START switch knob. Check for slow starting of engine or slow cranking speed.
Generating system	Observe BATTERY GENERATOR indicator and GEN WARNING light for normal indication during start and warmup.
Indicator lights and gages instrument (gage) panel	Observe engine and transmission indicator lights and gages for normal readings during warmup period. Fill fuel cell and check fuel level indicator for proper indication.
Tachometer	Observe that tachometer operates without excessive fluctuation or unusual noises.
Vehicle lighting	Check operation of dome lights in cab and driver's compartment, service headlamps, taillights, stop-lights, blackout and infrared lights.
Idle test	Run engine until normal operating temperature is reached. With transmission in neutral, engine should idle smoothly at 550-600 rpm.
Governed no-load test	Run engine until normal operating temperature is reached. With transmission in neutral and hydraulic pump power take-off switch OFF, open throttle until accelerator is fully depressed. Engine speed should stabilize at 2,400-2,450 rpm.
Stall test	Operate engine until normal operating temperature is reached. Lock the brakes and shift transmission into high (4th) speed range. With foot on brake pedal, slowly depress foot throttle until engine is at full throttle. Observe tachometer indication, a stall speed of between 1,850 and 2,075 rpm indicates properly operating engine and transmission. Check transmission in low range and reverse in the same manner.
Steering controls	Operate steering bar through full range. Check for satisfactory vehicle response. With vehicle operating at normal speeds and steering bar centered, observe if there is any tendency of vehicle to wander or pull to one side.
Transmission controls	Shift through all forward and reverse speed ranges to ensure that linkage operates smoothly and for satisfactory response in range selected.
Brake controls	Accelerate vehicle to a moderate speed, release accelerator and apply brakes. Observe that the vehicle stops effectively and without side pull. Stop the vehicle on an incline, depress brake control foot pedal. Position shift control lever to neutral (N) and set brakes with parking brake handle. Observe that brakes lock securely and vehicle is held in position.
Turret hydraulic system electric pump	With the vehicle engine off, set the oil pump motor switch to ON. Check that the oil pump operates, builds pressure to 2,400 psi, as shown on loader and rammer gage, and stops. Exercise the rammer and loader until the pressure drops below 1,600 psi and the motor turns on. Check hydraulic tubes, hoses and fittings for evidence of leakage.
Hull hydraulic system gear pump	Set the oil pump motor switch to OFF and start the vehicle engine. Turn the hydraulic pump power take-off clutch switch to ON. Check that pressure builds to

Table 4-2. Final Inspection and Road Test — Continued

Item to be inspected or tested	Procedure
	approximately 2,000 psi. Set the oil pump motor switch to OVER-RIDE a check that pressure does not exceed 2,400 psi.
Elevating and traversing controls	With vehicle on level ground, elevate and traverse cannon through entire ran both manually and by power. Smooth uninterrupted elevation and traverse i required. Turret speed should decelerate prior to completing left or right traverse cycle. Refer to TM 9-2300-216-10 for turret operating instructions.
Loader and rammer controls	Position controls to move loader into loading position. Check operation of traveling cylinder, ram and stow position locks ("B" vehicles) and smooth operati of loader and rammer. Lift shell up into rammer tray. Remove shell from tr and check rammer operation. Refer to TM 9-2300-216-10 for loader-ramme operating instructions.
Exercising the weapon	Operate retraction valve and move the cannon into the travel position and ba into the battery position several times. Refer to TM 9-2300-216-10 for opera ing instructions.
Spade control	Position HYD. PUMP P.T.O. CLUTCH switch to ON. Unlock spade cylinder lo Position spade control handle to LOWER. Lower spade to emplacement po tion, observing movement of spade and control. Check hydraulic hoses, fitting and spade cylinder for evidence of leakage. Raise spade and secure with spa cylinder lock.
Engine governed speed and performance	Test engine for normal acceleration and power in each speed range. While testing in low range, accelerate with wide open throttle from low speed to top spee Governed speed under load should reach but not exceed 2,450 rpm.
Lockout cylinders	**NOTE** Vehicles serial number 1 through 297 on the M107 and 1 through 413 on the M110 are equipped with ten lockout cylinders, one on each road wheel. Vehicles serial number 298 and on in the M107 and 414 and on in the M110, do not have lockout cylinders on third (center) intermediate road wheels. With suspension locked out, drive tracks alternately over a 4 x 4 block o equivalent. Road wheels should not rise as they pass over block except thir road wheel on vehicles serial number 298 and on for the M107 and serial number 414 and on for the M110. Unlock lockout cylinders and drive tracks alternately over 4 x 4 block or equivalent. All road wheels and arms should rise a they pass over block.
	AFTER ROAD TEST
Wheel hub temperature	Immediately after road test, feel all road wheel hubs for variation in temperatur Check for excessive heating.
Leakage	Visually inspect interior and exterior of vehicle for any evidence of coolant, fuel or hydraulic fluid leaks. Correct all leaks by tightening fittings, or replacemen of defective parts.
Final road test	After all services and inspections have been completed, take the vehicle on a shor road test to ensure that all deficiencies have been corrected.

CHAPTER 5
POWERPLANT REPAIR

Section I. DESCRIPTION AND DATA

5-1. Description

The powerplant consists of a General Motors 8V71T diesel engine, model 7083-7398, a cross-drive transmission assembly of the Allison power train, model XTG 411-2A, a power take-off, sending transmitters, warning switches, electric wiring harnesses, oil hoses, fuel hoses, steering controls throttle controls, brake controls, powerplant reservoir, exhaust pipe and elbow, speedometer and tachometer cables, engine mount and support and the components necessary to modify the engine and transmission for adaption to the M107 Gun Vehicle and M110/M110A1 Howitzer Vehicles.

The power take-off consists of an idler gear and an output gear contained in a gear case. The gear case is flanged to mate with its mounting surface on the engine transfer case. The power take-off idler gear mates with transfer gearing to drive the power take-off output gear. Power from the power take-off to the auxiliary drive is transmitted by a shaft and shaft adapter. The shaft adapter engages the power take-off output gear.

5-2. Data

a. Powerplant Data. Refer to TM 9-2300-216-20 for general data on the power plant.

b. Engine Data. Refer to TM 9-2815-202-34 for detailed description and data of the engine.

c. Transmission Data. Refer to TM 9-2520-234-35 for detailed description and data of the transmission.

d. Power Take-Off Data.

Military number	10902000
Manufacturer	Pacific Car and Foundry Company Renton, Washington
Dimensions	19 in. lg x 10-¾ in. h x 8-½ in. w
Engine rpm to power take-off output ratio	1.32:1

Section II. POWERPLANT DISASSEMBLY INTO MAJOR COMPONENTS

5-3. General

This section contains instructions for disassembly of the powerplant into its three major components, engine, transmission and power take-off assembly. Refer to TM 9-2300-216-20 for removal and installation of the power plant in the vehicle. Components such as transmitters, switches, harnesses, hoses and controls have been added to the powerplant major components to modify them for the M107 Gun Vehicle and M110 Howitzer Vehicle. Removal or installation of these components follows separation of the engine, transmission and power take-off.

5-4. Engine Removal from Transmission

a. Place powerplant on suitable support. Make sure transmission, transmission transfer and engine are adequately supported.

b. Disconnect two engine oil filter hoses from elbows in engine oil filters (A, fig. 5-1).

c. Disconnect two transmitter-to-oil cooler hoses from elbows in transmission lockup shift control valve body (A, fig. 5-1).

d. Disconnect transmission drain hose from elbow located at right side of transmission on transfer case and remove elbow and bushing (B, fig. 5-1).

e. Disconnect governor throttle control rod from governor (C, fig. 5-1).

f. Disconnect electric leads from transmission oil pressure transmitter located on left side of transmission (D, fig. 5-1).

g. Remove three clamps securing tachometer cable and wiring leads on left side of transmission (D, fig. 5-1). Pull tachometer cable and leads free of transmission and place on engine.

h. Disconnect two electric leads from neutral position switch (E, fig. 5-1).

i. Remove two exhaust pipe clamps securing turbocharger exhaust tubing to exhaust manifold (F, fig. 5-1).

j. Disconnect air line from turbocharger (G, fig. 5-1).

k. Disconnect two air duct clamps from turbocharger (G, fig. 5-1).

l. Remove lock wire, four screws, and lock washers securing turbocharger to transmission transfer (H, fig. 5-1).

m. Attach sling to turbocharger lifting eye and, using suitable hoist having a one-ton minimum capacity, lift turbocharger from engine (I, fig. 5-1).

n. Attach engine sling (NSN 4910-00-001-3993) to engine. Attach transmission lifting bracket (NSN 4910-00-977-5580) to transmission. Attach transmission lifting sling (NSN 4910-00-473-7556) to transmission and lifting bracket. Attach suitable hoist having a three-ton minimum capacity to engine sling and remove slack from sling cables. Install a second hoist to transmission and remove slack from sling cables.

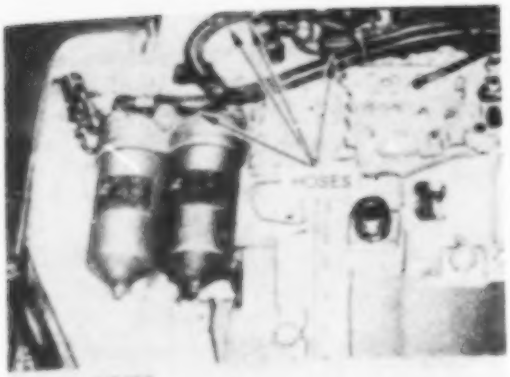
o. Remove six screws and lock washers securing engine-to-transmission support to transmission (J, fig. 5-1).

p. Remove 14 screws (nine 2-½ inches long, three 2-¼ inches long and two 3-½ inches long) and lock washers securing transmission transfer to engine flywheel bell housing (K, fig. 5-1). Tag screws for proper location for identification during assembly.

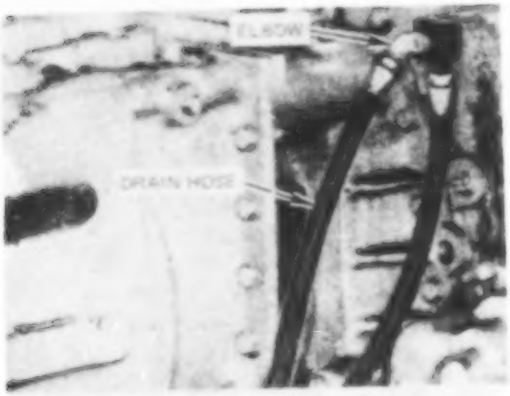
q. Using hoist, carefully swing and lift engine from transmission transfer (L, fig. 5-1). Place engine in engine test stand (NSN 4910-00-795-0189) using brackets (NSN 4910-00-737-0432), cradle (NSN 4910-00-795-0198) and drip pan (NSN 4910-00-545-8639) or place engine on suitable support for removal of accessories. Refer to TM 9-2815-202-34 for procedures of mounting engine in stand.

NOTE

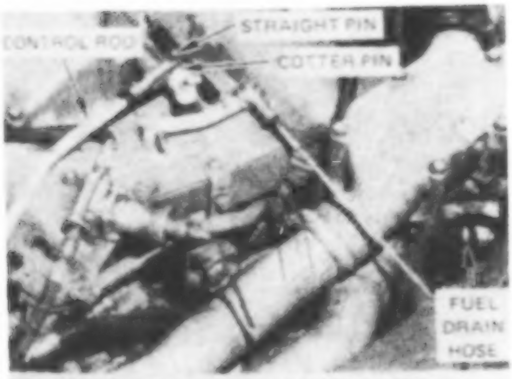
If transmission coupling shaft was remov with engine removal, remove shaft fro engine and install in transmission transfer.



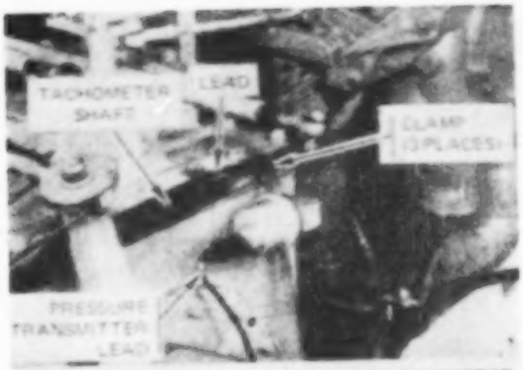
A OIL HOSES


ELBOW
DRAIN HOSE

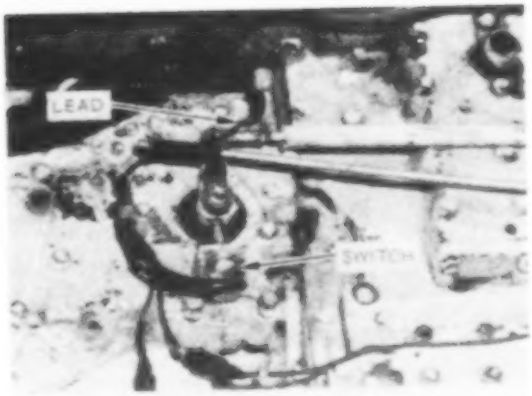
B TRANSMISSION DRAIN HOSE


STRAIGHT PIN
CONTROL ROD
COTTER PIN
FUEL DRAIN HOSE

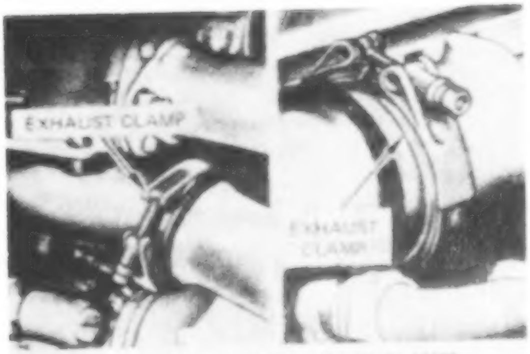
C GOVERNOR THROTTLE CONTROL ROD


TACHOMETER SHAFT
LEAD
CLAMP (3 PLACES)
PRESSURE TRANSMITTER LEAD

D ELECTRIC LEADS, CLAMPS, AND TACHOMETER SHAFT


LEAD
SWITCH

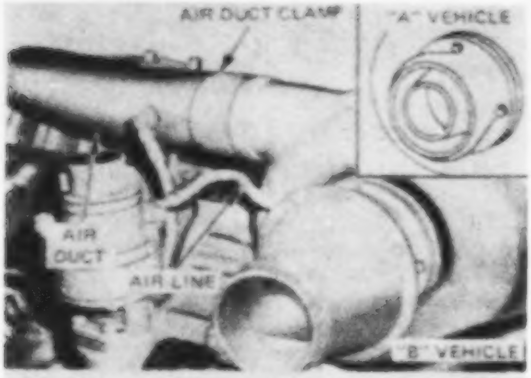
E NEUTRAL POSITION SWITCH LEADS


EXHAUST CLAMP
EXHAUST CLAMP

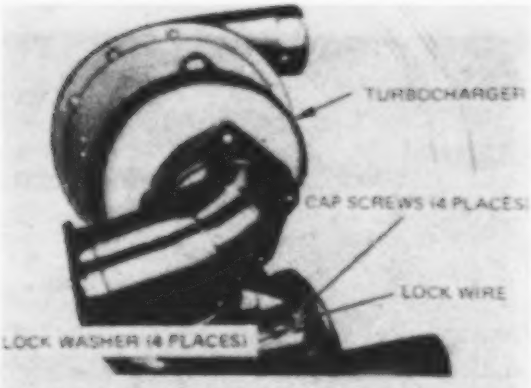
F TURBOCHARGER EXHAUST PIPE CLAMPS

TA 011804

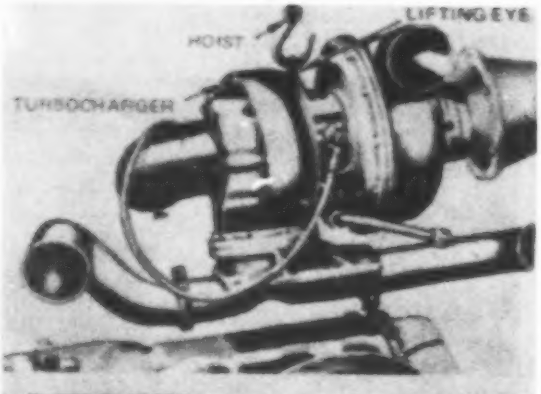
Figure 5-1. Disassembly of powerplant into major components (sheet 1 of 2).


AIR DUCT CLAMP
"A" VEHICLE
AIR DUCT
AIR LINE
"B" VEHICLE

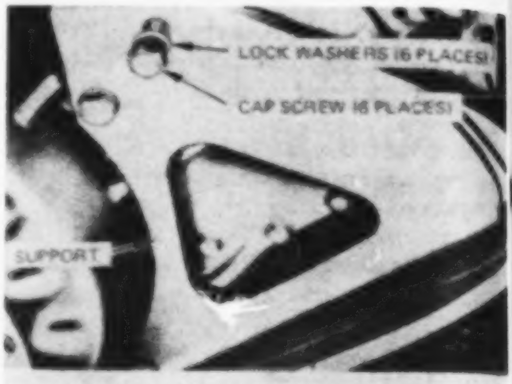
G. AIR DUCT AND SUPERCHARGER OIL RETURN LINE


TURBOCHARGER
CAP SCREWS (4 PLACES)
LOCK WIRE
LOCK WASHER (4 PLACES)

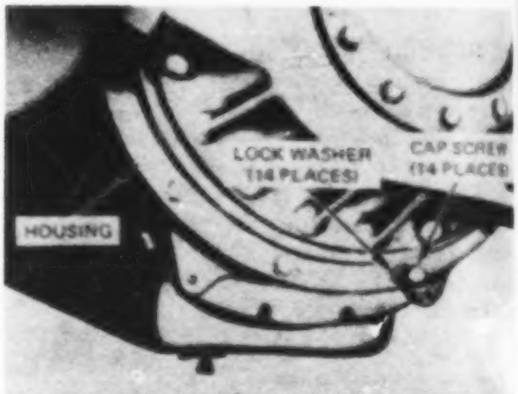
H. CAP SCREWS AND LOCK WASHERS.


LIFTING EYE
HOIST
TURBOCHARGER

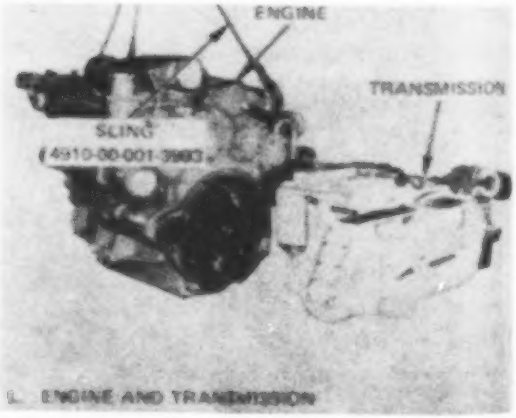
I. TURBOCHARGER


LOCK WASHERS (6 PLACES)
CAP SCREW (6 PLACES)
SUPPORT

J. CAP SCREWS, LOCK WASHERS, AND ENGINE TO TRANSMISSION SUPPORT


LOCK WASHER (14 PLACES)
CAP SCREW (14 PLACES)
HOUSING

K. CAP SCREWS, LOCK WASHERS, AND FLYWHEEL BELL HOUSING.


ENGINE
TRANSMISSION
SLING (4910-00-001-3993)

L. ENGINE AND TRANSMISSION

TA 011

Figure 5-1. Disassembly of powerplant into major components (sheet 2 of 2).

5-5. Power Take-Off Removal from Transmission Transfer

a. Remove lock wire, eight screws and flat washers securing power take-off to transmission transfer (fig. 5-2).

b. Lift power take-off and its attached locating dowels from transmission transfer case.

c. Remove and discard gasket.

d. Install cover (PN 19207-8351751) and gasket on transfer case over power take-off access opening.

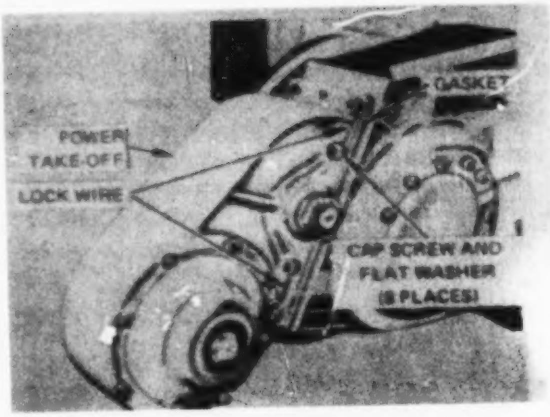


Figure 5-2. Power take-off removal or installation.

Section III. ENGINE ACCESSORIES REMOVAL

5-6. General

This section contains instructions for the removal of the aeration detector ("B" vehicles), fuel system purge and prime solenoid and hoses ("B" vehicles), vibration coupling, wiring harnesses, hoses and fittings, reservoir, exhaust elbow and pipe, solenoid relay, switches, transmitters, tachometer cable and adapter, support, mount, intake air adapter ("A" vehicles) or intake air screen assembly ("B" vehicles), governor control rod and levers, and engine oil filters. These items have been added to the engine to modify it for use in the M107 Gun Vehicle and M110 Howitzer Vehicle.

5-7. Vibration Coupling Removal

(Fig. 5-3)

a. Remove 12 self-locking screws securing mass ring to crankcase end of engine and remove preformed packing, mass ring and vibration coupling.

b. Separate mass ring and vibration coupling.

c. Tag and attach mass ring to engine.

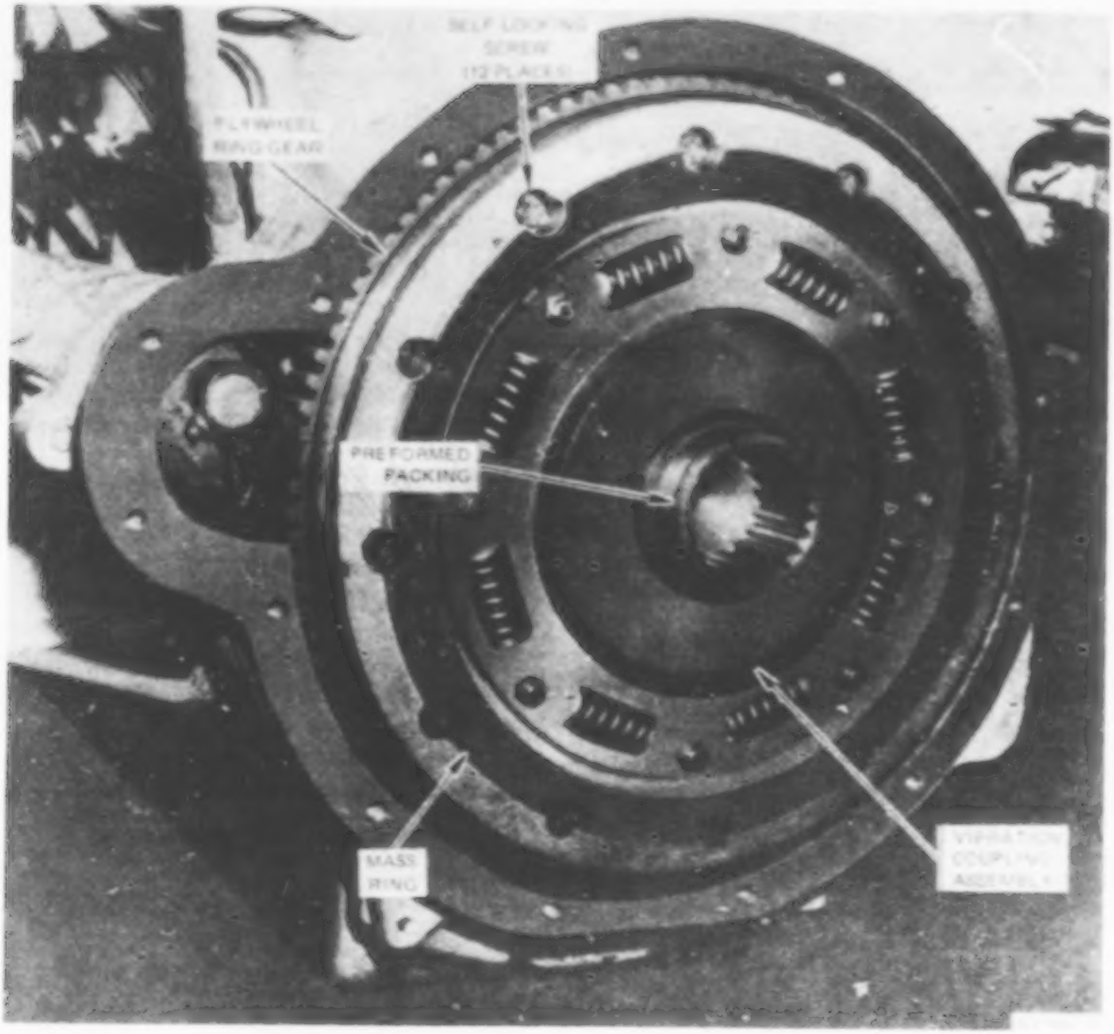


Figure 5-3. Mass ring and vibration coupling removal or installation.

5-8. Wiring Harness and Lead Removal

(Fig. 5-4)

a. Check all electrical leads and harnesses when removed to make sure they have harness and circuit markings to allow correct reassembly. Tag doubtful connections.

b. Remove loop clamps securing wiring harnesses to engine and transmission (A). Remove cover securing wiring harnesses to engine-to-transmission support (B).

c. Remove straps tying harnesses together (C).

d. Disconnect starter electrical lead (10901842) from starter and remove starter electrical lead.

e. Disconnect starter-to-ground lead (10901839) from starter and remove screw and two lock washers from engine and remove lead.

f. Disconnect relay-to-starter and neutral position switch harness (11643129) from relay and from starter solenoid and remove harness.

g. Disconnect harness leads from transmitters, switches and air box heater bracket and remove engine warning lights circuits-to-bulkhead harness (10919945).

h. Disconnect warning light low coolant detector-to-bulkhead harness (11675566) from aeration detector and remove screw securing ground lug and remove harness, "B" vehicles.

i. Disconnect aeration detector Diode assembly (11631547) from aeration detector and from connector assembly and remove diode assembly, "B" vehicles.

j. Disconnect aeration detector connector assembly (11675567) from neutral position switch harness and remove connector assembly, "B" vehicles.

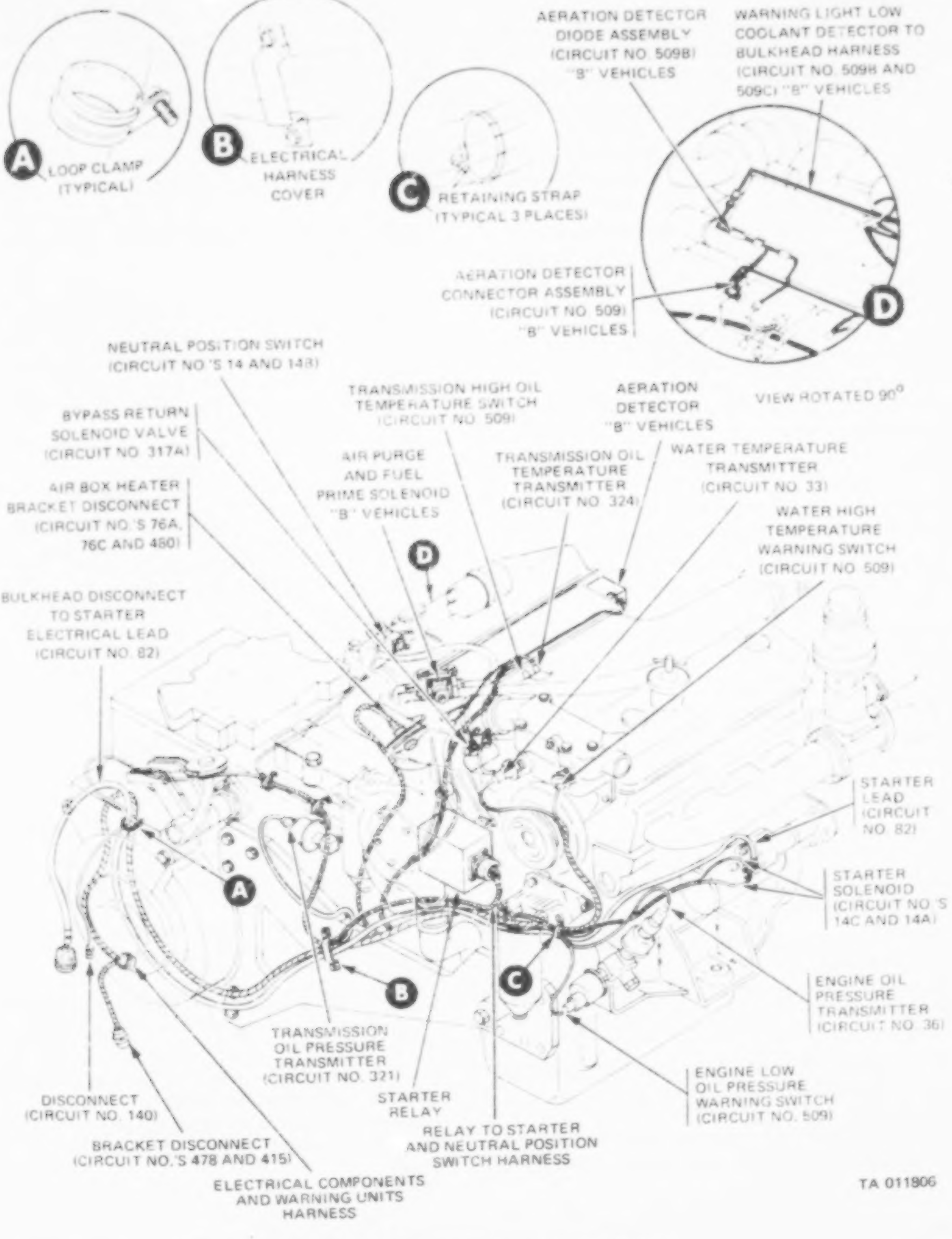

A
LOOP CLAMP (TYPICAL)
B
ELECTRICAL HARNESS COVER
C
RETAINING STRAP (TYPICAL 3 PLACES)
AERATION DETECTOR DIODE ASSEMBLY (CIRCUIT NO. 509B) "B" VEHICLES
WARNING LIGHT LOW COOLANT DETECTOR TO BULKHEAD HARNESS (CIRCUIT NO. 509B AND 509C) "B" VEHICLES
AERATION DETECTOR CONNECTOR ASSEMBLY (CIRCUIT NO. 509) "B" VEHICLES
D
VIEW ROTATED 90°
NEUTRAL POSITION SWITCH (CIRCUIT NO.'S 14 AND 14B)
BYPASS RETURN SOLENOID VALVE (CIRCUIT NO. 317A)
AIR BOX HEATER BRACKET DISCONNECT (CIRCUIT NO.'S 76A, 76C AND 460)
BULKHEAD DISCONNECT TO STARTER ELECTRICAL LEAD (CIRCUIT NO. 82)
TRANSMISSION HIGH OIL TEMPERATURE SWITCH (CIRCUIT NO. 509)
AIR PURGE AND FUEL PRIME SOLENOID "B" VEHICLES
TRANSMISSION OIL TEMPERATURE TRANSMITTER (CIRCUIT NO. 324)
AERATION DETECTOR "B" VEHICLES
WATER TEMPERATURE TRANSMITTER (CIRCUIT NO. 33)
WATER HIGH TEMPERATURE WARNING SWITCH (CIRCUIT NO. 509)
D
STARTER LEAD (CIRCUIT NO. 82)
STARTER SOLENOID (CIRCUIT NO.'S 14C AND 14A)
A
B
C
ENGINE OIL PRESSURE TRANSMITTER (CIRCUIT NO. 36)
TRANSMISSION OIL PRESSURE TRANSMITTER (CIRCUIT NO. 321)
STARTER RELAY
ENGINE LOW OIL PRESSURE WARNING SWITCH (CIRCUIT NO. 509)
DISCONNECT (CIRCUIT NO. 140)
BRACKET DISCONNECT (CIRCUIT NO.'S 478 AND 415)
RELAY TO STARTER AND NEUTRAL POSITION SWITCH HARNESS
ELECTRICAL COMPONENTS AND WARNING UNITS HARNESS
TA 011806

Figure 5-4. Engine wiring harness and lead removal or installation.

5-9. Engine External Oil Hoses and Fittings Removal

Remove engine external oil hoses and fittings from engine oil cooler and power plant reservoir. Refer to TM 9-2300-216-20 for removal procedures.

5-10. Transmission Oil Cooler Hoses and Fittings Removal

Remove transmission oil cooler hoses and fittings from engine oil cooler and power plant reservoir. Refer to TM 9-2300-216-20 for removal procedures.

5-11. Power Plant Reservoir Removal

Remove power plant reservoir, breather and drain tube from engine oil cooler. Refer to TM 9-2300-216-20 for removal procedures.

5-12. Fuel Hoses and Fittings Removal

Remove fuel hoses and fittings from low pressure filter, fuel return connection, high pressure fuel filter and power plant reservoir. Refer to TM 9-2300-216-20 for removal procedures.

5-13. Aeration Detector Removal, "B" vehicles

Remove aeration detector from engine. Refer to TM 9-2300-216-20 for removal procedures.

5-14. Fuel System Purge and Prime Solenoid and Hoses Removal, "B" vehicles

Remove fuel system purge and prime solenoid and hoses. Refer to TM 9-2300-216-20 for removal procedures.

5-15. Engine Exhaust Manifold Elbow Removal

Remove exhaust manifold elbow and valve from turbocharger. Refer to TM 9-2300-216-20 for removal procedure.

5-16. Engine Exhaust Pipe Removal

Remove engine exhaust pipe and valve from turbocharger regulator. Refer to TM 9-2300-216-20 for removal procedures.

5-17. Starter Control Solenoid Relay Removal

Remove starter control solenoid relay from front of engine. Refer to TM 9-2300-216-20 for removal procedures.

5-18. Warning Switches and Transmitters Removal

(Fig. 5-4)

Remove engine low oil pressure warning switch, engine oil pressure transmitter and adapter, water temperature transmitter, water high temperature warning switch, transmission high oil temperature warning switch and transmission oil temperature transmitte from engine. Refer to TM 9-2300-216-20 for removal procedures.

5-19. Tachometer Cable and Adapter Removal

Remove tachometer cable and adapter from rear of engine. Refer to TM 9-2300-216-20 for removal procedures.

5-20. Engine-to-Transmission Support Removal

(Fig. 5-5)

a. Remove low pressure fuel filter from engine.

b. Remove six screws and lock washers securing engine-to-transmission support to engine and remove support.

c. Install low pressure fuel filter on engine.

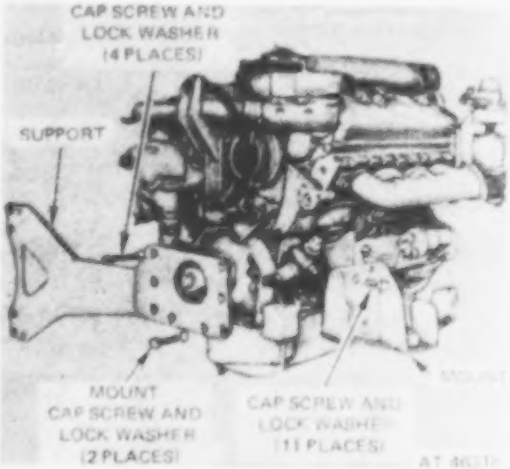

CAP SCREW AND LOCK WASHER (4 PLACES)
SUPPORT
MOUNT
MOUNT CAP SCREW AND LOCK WASHER (2 PLACES)
CAP SCREW AND LOCK WASHER (11 PLACES)

Figure 5-5. Engine-to-transmission support and engine mount removal or installation.

5-21. Powerplant Engine Mount Removal

(Fig. 5-5)

Remove powerplant engine mount from engine left side. Refer to TM 9-2300-216-20 for removal procedures.

5-22. Engine Intake Air Adapter Removal, "A" Vehicles

(Fig. 5-6)

a. Remove lock wire and four screws securing engine intake air adapter to turbocharger.

b. Remove intake air adapter and gasket. Clean turbocharger mounting surface and close opening with tape.

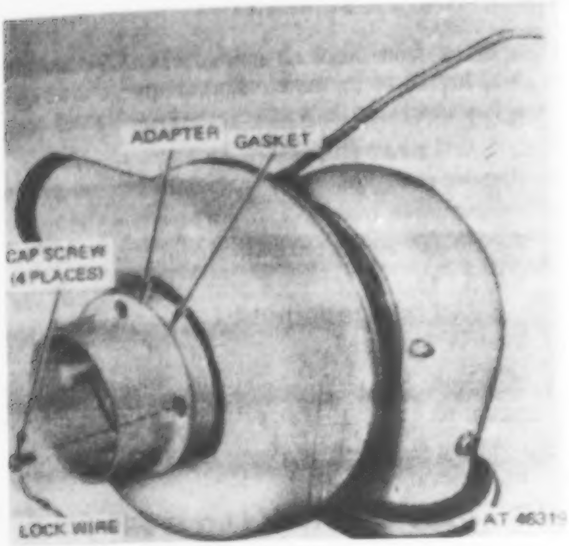

ADAPTER
GASKET
CAP SCREW
(4 PLACES)
LOCK WIRE
AT 46319

Figure 5-6. Engine intake air adapter removal or installation ("A" vehicles).

5-23. Engine Intake Air Screen Assembly Removal, "B" Vehicles

(Fig. 5-7)

a. Remove lock wire and four screws securing engine intake air screen assembly to turbocharger.

b. Remove intake air screen assembly and gasket. Clean turbocharger mounting surface and close opening with tape.

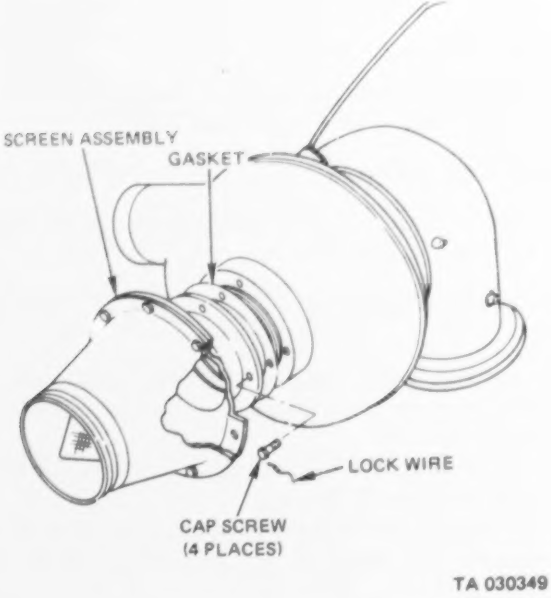

SCREEN ASSEMBLY
GASKET
LOCK WIRE
CAP SCREW
(4 PLACES)
TA 030349

Figure 5-7. Engine intake air screen removal or installation ("B" vehicles).

5-24. Governor Control Rod and Levers Removal

Remove governor control rod, remove control lever, engine shutdown lever, engine shutdown cable return spring and spring tab from engine governor.

5-25. Turbocharger Reinstallation on Engine

Position turbocharger on engine and secure exhaust tubing to exhaust manifold with two exhaust pipe clamps (F, fig. 5-1). Attach air line to turbocharger and install air duct clamp (G, fig. 5-1).

5-26. Engine Oil Filters

Secure engine oil filters to engine when removed from transmission, paragraph 5-28.

Section IV. TRANSMISSION ACCESSORIES REMOVAL

5-27. General

This section contains instructions for the removal of the engine oil filters and filter bracket, transmission cooling oil elbows, speedometer drive shaft and adapters, neutral position switch and bracket, hoses and manifold, shifting control remote control lever and shift linkage rod, throttle and accelerator control linkage, brake control linkage, transmission oil pressure transmitter and transmitter adapter. These items have been added to the transmission to modify it for use in the M107 Gun Vehicle and M110 Howitzer Vehicle.

5-28. Engine Oil Filter Removal

Remove engine oil filters and filter bracket from right end of transmission. Refer to TM 9-2300-216-20 for removal procedures.

5-29. Transmission Cooling Oil Elbows Removal

Remove two transmission cooling oil elbows from transmission lockup shift control valve body. Plug openings in valve body.

5-30. Speedometer Drive Shaft and Adapters Removal

Remove clamps, speedometer drive shaft and drive shaft adapters from right side of transmission. Refer to TM 9-2300-216-20 for removal procedures.

5-31. Neutral Position Switch and Bracket Removal

Remove clamp, neutral position switch and mounting bracket from top of transmission. Refer to TM 9-2300-216-20 for removal procedures.

5-32. Shifting Control Linkage Rod and Lever Removal

Remove shift linkage rod and shifting control remote control lever from top of transmission. Refer to TM 9-2300-216-20 for procedures.

5-33. Throttle and Accelerator Control Linkage Removal

Remove bellcrank to transmission rod, bulkhead to bellcrank rod, governor linkage bellcrank, bellcrank mounting stud and transmission throttle control lever from top of transmission. Refer to TM 9-2300-216-20 for removal procedures.

5-34. Brake Control Levers and Cable Removal

Remove brake control cable and pulley, foot brake lever, left brake lever and right brake lever from left side of transmission. Refer to TM 9-2300-216-20 for removal procedures.

5-35. Transmission Oil Pressure Transmitter and Adapter Removal

Remove transmission oil pressure transmitter and transmitter adapter from left side of transmission. Plug port in transmission. Refer to TM 9-2300-216-20 for removal procedures.

Section V. ENGINE REPAIR

5-36. Engine Repair

Refer to TM 9-2815-202-34 for disassembly, repair, rebuild standards and assembly of the General Motors 8V71T diesel engine model 7083-7398.

Section VI. TRANSMISSION REPAIR

5-37. Transmission Repair

Refer to TM 9-2520-234-35 for disassembly, repair, rebuild standards and assembly of the Allison Power Train model XTG-411-2A.

Section VII. POWER TAKE-OFF REPAIR

5-38. General

This section contains instructions for the disassembly, cleaning, inspection, repair and assembly of the power take-off assembly.

5-39. Power Take-Off Disassembly

a. Remove nut, lock washer and shaft collar from idler gear bolt (A, fig. 5-8).

b. Use wood or soft metal block and drive idler gear bolt from idler gear and gearcase (B, fig. 5-8).

c. Remove and discard preformed packing from idler gear bolt.

d. Lift idler spur gear and bearings from gearcase (C, fig. 5-8).

e. Remove roller bearing cups, one from each side of idler spur gear and remove bearing sleeve spacer (D and E, fig. 5-8).

f. Using suitable soft bar, press bearing cones from idler spur gear (F, fig. 5-8).

g. Remove and discard preformed packing from gearcase at each idler gear bolt mounting recess (G, fig. 5-8).

h. Remove retaining ring from output gear coupling bolt (H, fig. 5-8). Pull bolt and lock washer from output gear (I, fig. 5-8).

i. Remove lock wire and eight screws securing cover to gearcase (J, fig. 5-8).

NOTE

Screws are installed with sealing compounds on threads.

CAUTION

Do not damage mating surfaces of cover and gearcase.

j. Use soft hammer to loosen cover. Pry carefully around edge of cover to pull locating dowel pins from case and remove cover (K, fig. 5-8).

k. Remove and discard preformed packing from gearcase (L, fig. 5-8).

l. Remove two gear-to-cover seals from cover using replacer (5120-00-722-4089) and handle (5120-00-316-9182).

NOTE

Seals are installed with sealing compound on outer diameter.

m. Remove dowel pins from cover only if damaged.

n. Use soft metal bar and tap output gear lightly to loosen gearcase bearings and remove gear and bearings from gearcase (N and O, fig. 5-8).

o. Using suitable puller, remove gearcase bearing from output gear (P, fig. 5-8).

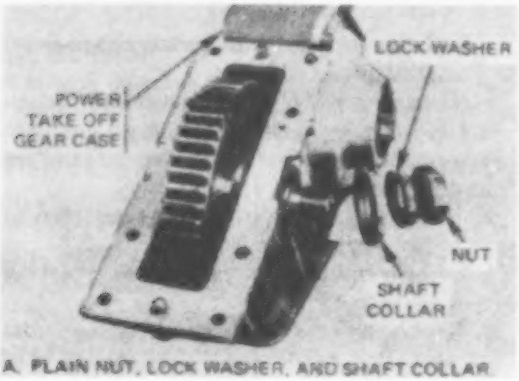
p. Using suitable puller, remove cover bearing from output gear (Q, fig. 5-8).

q. Remove and discard two gear-to-case seals from gearcase, using handle (NSN 5120-00-316-9182) and replacer (NSN 5120-00-722-4093).

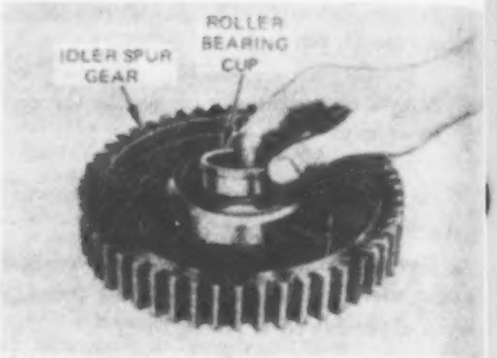
NOTE

Seals are installed with sealing compound on outer diameter.

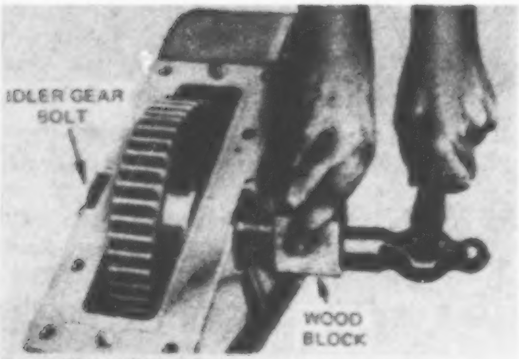
r. Remove dowel pins from gearcase only if damaged.


LOCK WASHER
POWER TAKE OFF GEAR CASE
NUT
SHAFT COLLAR

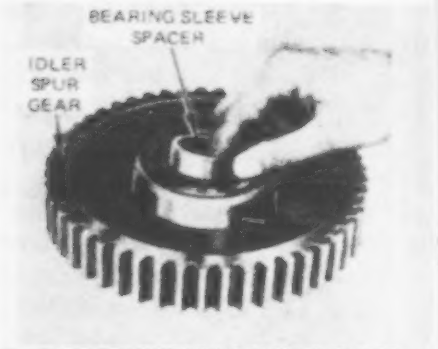
A. PLAIN NUT, LOCK WASHER, AND SHAFT COLLAR


IDLER SPUR GEAR
ROLLER BEARING CUP

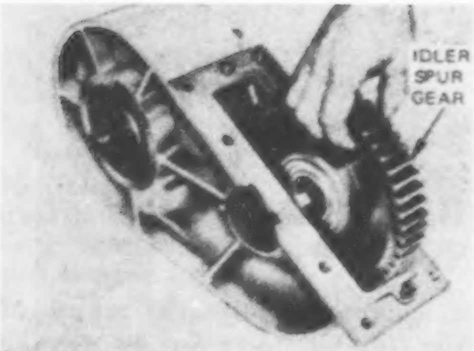
D. IDLER GEAR BEARING CUP.


IDLER GEAR BOLT
WOOD BLOCK

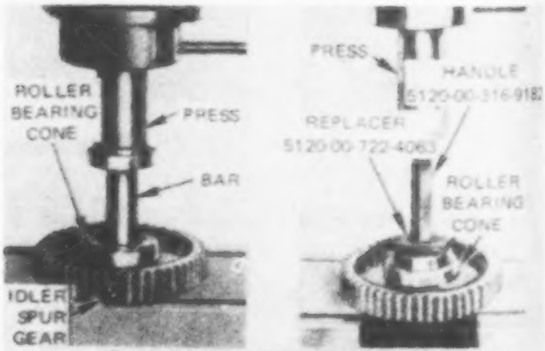
B. IDLER GEAR BOLT.


BEARING SLEEVE SPACER
IDLER SPUR GEAR

E. IDLER GEAR BEARING SLEEVE SPACER.


IDLER SPUR GEAR

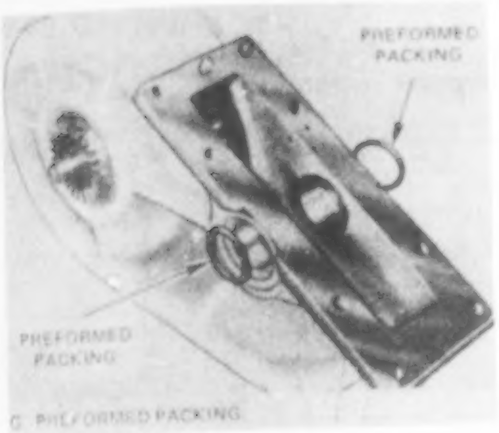
C. IDLER SPUR GEAR.


ROLLER BEARING CONE
PRESS
BAR
IDLER SPUR GEAR
PRESS
HANDLE 5120-00-316-918
REPLACER 5120-00-722-4063
ROLLER BEARING CONE

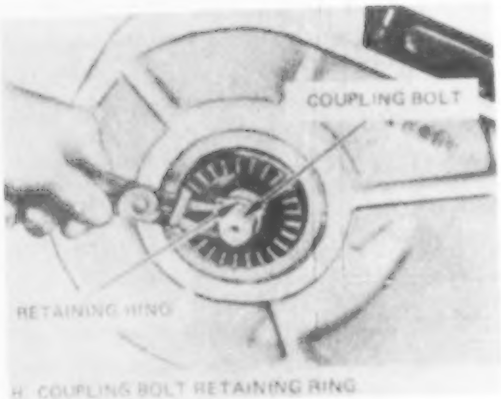
F. IDLER GEAR ROLLER BEARING CONES.

TA [illegible]

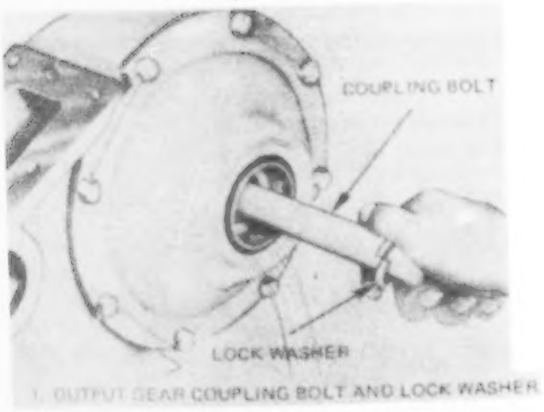
Figure 5-8. Power take-off disassembly or assembly (sheet 1 of 3).


PREFORMED PACKING
PREFORMED PACKING

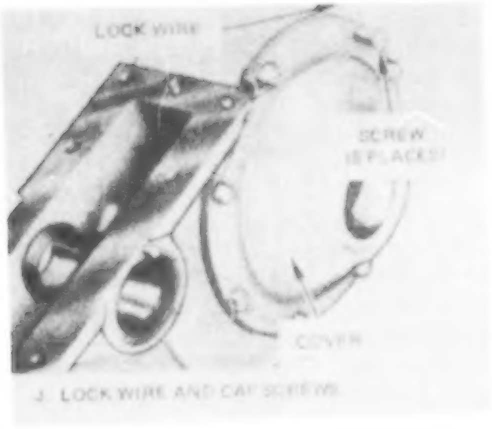
G. PREFORMED PACKING


COUPLING BOLT
RETAINING RING

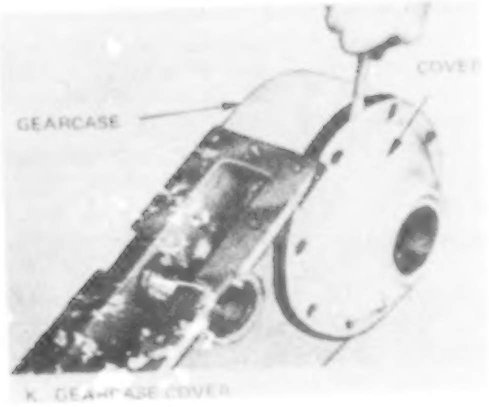
H. COUPLING BOLT RETAINING RING


COUPLING BOLT
LOCK WASHER

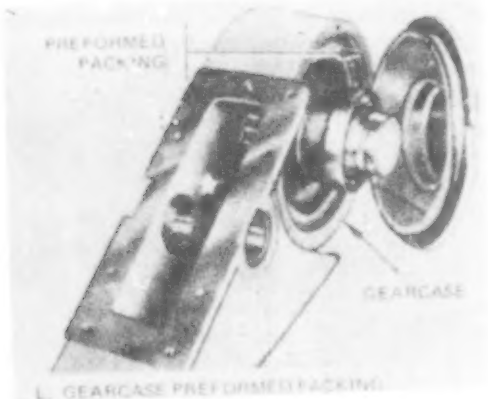
I. OUTPUT GEAR COUPLING BOLT AND LOCK WASHER


LOCK WIRE
SCREW (6 PLACES)
COVER

J. LOCK WIRE AND CAP SCREWS


GEARCASE
COVER

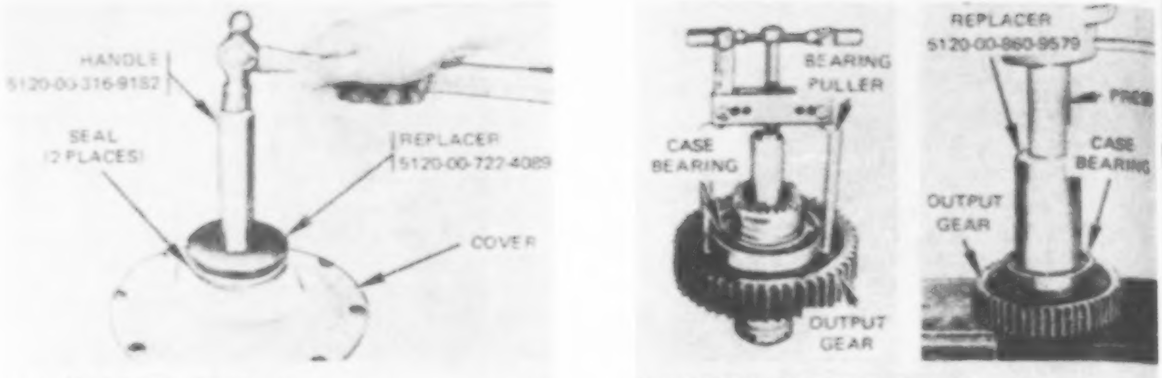
K. GEARCASE COVER


PREFORMED PACKING
GEARCASE

L. GEARCASE PREFORMED PACKING

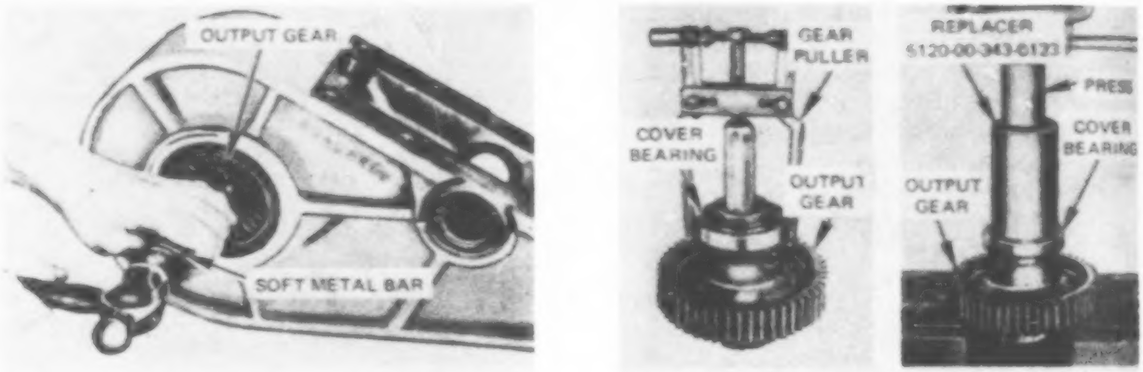
AT 46321

Figure 5-8. Power take-off disassembly or assembly (sheet 2 of 3).


HANDLE
5120-00-316-9182
SEAL
(2 PLACES)
REPLACER
5120-00-722-4089
COVER
BEARING
PULLER
CASE
BEARING
OUTPUT
GEAR
REPLACER
5120-00-860-9579
PRESS
CASE
BEARING
OUTPUT
GEAR

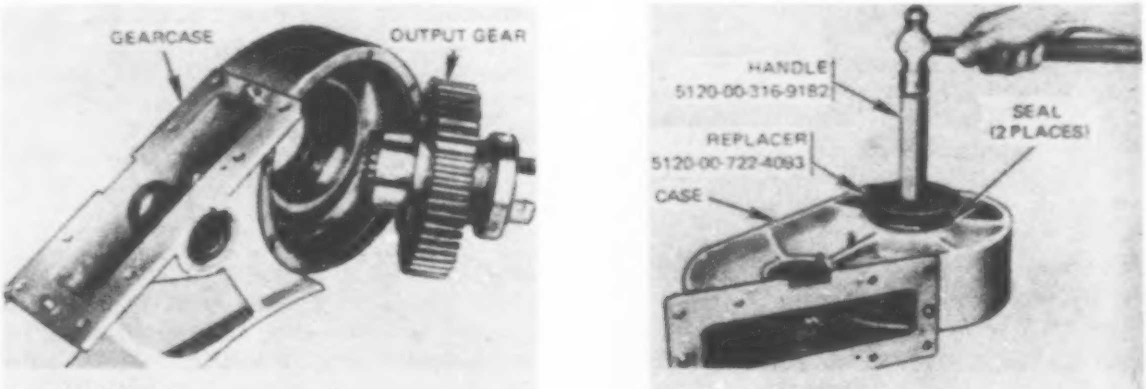
M. GEAR TO COVER SEALS.

P. OUTPUT GEAR CASE BEARINGS.


OUTPUT GEAR
SOFT METAL BAR
GEAR
PULLER
COVER
BEARING
OUTPUT
GEAR
REPLACER
5120-00-343-6123
PRESS
COVER
BEARING
OUTPUT
GEAR

N. OUTPUT GEAR AND BEARINGS.

Q. OUTPUT GEAR COVER BEARING.


GEARCASE
OUTPUT GEAR
HANDLE
5120-00-316-9182
REPLACER
5120-00-722-4093
CASE
SEAL
(2 PLACES)

O. OUTPUT GEAR.

R. GEAR-TO-CASE SEALS.

TA

Figure 5-8. Power take-off disassembly or assembly (sheet 3 of 3).

5-40. Cleaning

a. Clean all metal parts with dry-cleaning solvent (SD-2).

b. Remove sealing compound from cover screws, cover and gearcase with dry-cleaning solvent (SD-2) or alcohol and wire brush.

CAUTION

Do not spin bearings with compressed air.

c. Dry all parts, except bearings, with clean, dry low pressure compressed air.

d. Clean bearings in accordance with TM 9-214.

e. Remove rust or corrosion.

(1) Apply dry-cleaning solvent (SD-2) to corroded surface.

(2) Remove corrosion with wire brush and crocus cloth.

(3) Rinse surface with dry-cleaning solvent (SD-2).

(4) Dry with clean, dry low pressure compressed air.

5-41. Inspection

a. Inspect all parts for physical damage, breaks, pits, cracks, sharp ragged edges, deformation, rusted or deteriorated areas, and for chipped or cracked paint.

b. Inspect bearings in accordance with TM 9-214.

c. Inspect all threaded areas for clean undamaged condition and for evidence of having been cross-threaded.

d. Inspect gear teeth for wear, chipped or cracked areas. Inspect output gear cadmium plated bearing surfaces for scratches.

e. Inspect and measure parts for wear in accordance with repair standards table 5-1 and figure 5-10.

5-42. Repair

a. Replace all seals and preformed packings.

b. File down sharp ragged edges on cover and gearcase.

c. Weld small cracks, breaks on cover or gearcase.

d. Use thread chaser on damaged threaded areas except on output gear coupling bolt. Discard bolt if threads are damaged.

e. Replace defective non-repairable parts and parts that are worn beyond wear limits specified in repair standards table 5-1.

f. Apply one coat of rust inhibiting primer (Federal Specification TT-P-659) to bare surfaces requiring paint. Allow primer to dry a minimum of 30 minutes. Apply enamel paint to match existing color (white enamel, Federal Specification TT-E-489) to primed surfaces.

5-43. Power Take-Off Assembly

a. Coat outside diameter of two gear-to-case seals with sealing compound (Grade AV, Specification MIL-S-22473).

b. Install gear-to-case seals in gearcase, with seal lips back to back, using replacer (NSN 5120-00-722-4093) and handle (NSN 5120-00-316-9182) (R, fig. 5-8).

c. Press cover bearing onto output gear using replacer (NSN 5120-00-343-0123) (Q, fig. 5-8).

d. Press case bearing onto output gear using replacer (NSN 5120-00-860-9579) (P, fig. 5-8).

e. Lightly lubricate shafts of output gear with engine oil (OE/HDO). Install output gear in gearcase (O, fig. 5-8). Make sure wiper lip of inner gear-to-case seal is properly seated on output gear with lip toward gear teeth. Use soft metal bar and tap output gear into gear case until bearing is firmly seated.

f. Coat outside diameter of two gear-to-cover seals with sealing compound (Grade AV, Specification MIL-S-22473).

g. Install gear-to-cover seals in cover, with seal lips back to back, using replacer (NSN 5120-00-722-4089) and handle (NSN 5120-00-316-9182) (M, fig. 5-8).

h. Install preformed packing in cover face of gearcase (L, fig. 5-8).

i. Lightly oil output gear shaft with engine oil (OE/HDO). Position cover over output gear. Make sure wiper lip of inner gear-to-cover seal is properly seated on output gear with lip toward gear teeth. Use soft metal bar and tap cover onto output gear until cover is firmly seated over bearing (J, fig. 5-8).

j. Apply sealing compound (Type II, Specification MIL-S-45180) to threads of eight cover screws. Install cover screws through cover into gearcase and tighten securely (J, fig. 5-8). Lock wire screws.

k. Install lock washer on coupling bolt and install bolt through cover and gearcase (I, fig. 5-8).

l. Install retaining ring on coupling bolt (H, fig. 5-8).

m. Install preformed packing in gearcase on each side adjacent to idler gear bolt (G, fig. 5-8).

n. Install bearing cone on each side of idler spur gear using replacer (NSN 5120-00-722-4063) and handle (NSN 5120-00-316-9182) (F, fig. 5-8). Make sure bearing cones are firmly seated.

o. Install preformed packing on idler gear bolt.

p. Install bearing cup, spacer, and bearing cup in idler spur gear (D, fig. 5-8).

q. Install idler gear bolt into gearcase on side opposite gearcase cover and start into first idler gear bearing. Reach through gearcase and lift spacer onto threaded end of bolt. Aline and start bolt through first gear bearing. Use soft face hammer to tap bolt through bearing (B, fig. 5-8). Make sure spacer is alined on bolt and tap bolt through gearcase. Turn bolt so notch in bolt head fits over lock pin.

r. Install shaft collar over idler gear bolt and lock pin (A, fig. 5-8). Secure idler gear bolt with lock washer and nut. Tighten nut securely.

Section VIII. ENGINE AND TRANSMISSION ACCESSORIES REPAIR

5-44. General

Refer to TM 9-2300-216-20 for disassembly, cleaning, inspection, repair and assembly procedures on the following engine and transmission accessories:

a. Electrical wiring harness and leads
b. Engine external oil hoses and fittings
c. Transmission oil cooler hoses and fittings
d. Power plant reservoir
e. Fuel hoses and fittings
f. Engine exhaust manifold elbow.
g. Engine exhaust pipe
h. Starter control solenoid relay
i. Warning switches and transmitters
j. Tachometer cable and adapter
k. Speedometer cable and adapter
l. Engine mount
m. Throttle controls and linkage
n. Shifting controls and linkage
o. Brake control levers and cable
p. Engine oil filters.

5-45. Engine Air Intake Screen Assembl Repair, "B" Vehicles

(Fig. 5-9)

a. Disassembly.

(1) Remove 8 nuts, lock washers and cap scre securing mounting case and hose connection case.

(2) Separate mounting case and hose connectio case and remove air intake screen and two gasket Discard gaskets.

b. Cleaning. Clean all parts with dry-cleaning so vent (SD-2). Dry all parts with low pressure compress air.

c. Inspection. Inspect cases and screen for crack breaks or deformation. Inspect hardware for cro threaded or stripped threads.

d. Repair. Replace defective screen or hardware wit new serviceable items. Replace gaskets.

e. Assembly. Assemble screen assembly in revers order of disassembly (*a.* above).

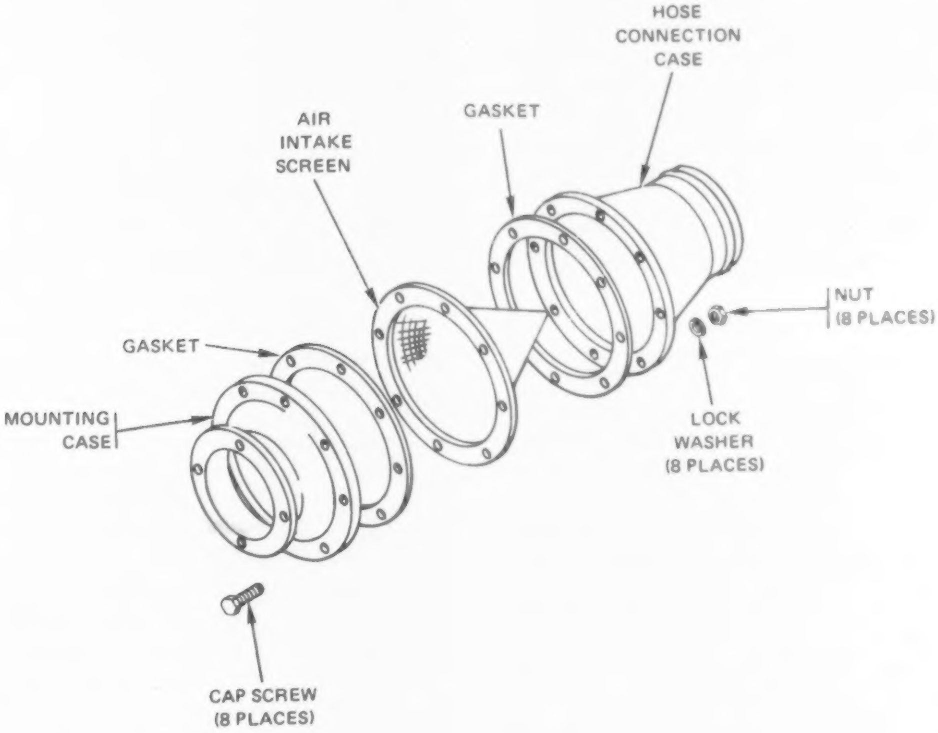


Figure 5-9. Engine air intake screen assembly disassembly or assembly ("B" vehicles).

Section IX. TRANSMISSION ACCESSORIES INSTALLATION

5-46. General

This section contains instructions for the installation of the transmission oil pressure transmitter and adapter, brake control linkage, throttle and accelerator control linkage, shifting control remote control lever and shift linkage rod, hoses, neutral position switch and bracket, speedometer drive shaft and adapter, transmission cooling oil elbows, engine oil filters and filter bracket. These items are added to the transmission to modify it for use in the M107 Gun Vehicle and M110 Howitzer Vehicle.

5-47. Transmission Oil Pressure Transmitter and Adapter Installation

Install transmission oil pressure transmitter adapter and pressure transmitter in left side of transmission. Refer to TM 9-2300-216-20 for installation procedures.

5-48. Brake Control Levers and Cable Installation

Install right brake lever, left brake lever, foot brake lever and control cable and pulley on left side of transmission. Refer to TM 9-2300-216-20 for installation procedures.

5-49. Throttle and Accelerator Control Linkage Installation

Install bellcrank mounting stud, transmission throttle control lever, governor linkage bellcrank, bulkhead to bellcrank rod and bellcrank to transmission rod on top of transmission. Refer to TM 9-2300-216-20 for installation procedures.

5-50. Shifting Control Linkage Rod and Lever Installation

Install shifting control remote control lever and shift linkage rod on top of transmission. Refer to TM 9-2300-216-20 for installation procedures.

5-51. Neutral Position Switch and Bracket Installation

Install neutral position switch mounting bracket, neutral position switch and switch lead clamp on top of transmission. Refer to TM 9-2300-216-20 for installation procedures.

5-52. Speedometer Drive Shaft and Adapters Installation

Install drive shaft adapters, speedometer drive shaft and shaft securing clamps on right side and front of transmission. Refer to TM 9-2300-216-20 for installation procedure.

5-53. Transmission Cooling Oil Elbows Installation

Remove plugs from transmission valve body and install two transmission cooling oil elbows in transmission lockup shift control valve body.

5-54. Engine Oil Filter Installation

Install engine oil filter bracket on right end of transmission. Install engine oil filters on filter bracket. Refer to TM 9-2300-216-20 for installation procedures.

Section X. ENGINE ACCESSORIES INSTALLATION

5-55. General

This section contains instructions for the installation of the engine governor control rod and levers, intake air adapter ("A" vehicles) or intake air screen assembly ("B" vehicles), engine mount, transmission-to-engine support, tachometer cable and adapter, transmitters, switches, solenoid relay, exhaust elbow and pipe, power plant reservoir, hoses and fittings, wiring harnesses, vibration coupling, fuel system prime and purge solenoid and hoses ("B" vehicles) and aeration detector ("B" vehicles). These items are added to the engine to modify it for use in the M107 Gun Vehicle and M110 Howitzer Vehicle.

5-56. Governor Control Rod and Levers Installation

Install governor control rod, remote control lever, engine shutdown lever, engine shutdown cable return spring and spring tab on engine governor. Refer to TM 9-2300-216-20 for installation procedures.

5-57. Engine Intake Air Adapter Installation, "A" Vehicles

(Fig. 5-6)

a. Remove tape or material closing turbocharger inlet opening.

b. Install gasket and intake air adapter on turbocharger intake mounting surface and secure adapter to turbocharger with four screws. Tighten 'screws securely and secure with lock wire.

5-58. Engine Intake Air Screen Assembly Installation, "B" Vehicles

(Fig. 5-7)

a. Remove tape or material closing turbocharger inlet opening.

b. Install gasket and intake air screen assembly on turbocharger intake mounting surface and secure screen assembly to turbocharger with four screws. Tighten screws securely and secure with lock wire.

5-59. Power Plant Engine Mount Installation

(Fig. 5-5)

Install power plant engine mount on engine left side. Torque screws to 38-40 lb ft. Refer to TM 9-2300-216-20 for installation procedures.

5-60. Engine-to-Transmission Support Installation

(Fig. 5-5)

a. Make sure mating surfaces of engine and support are clean, dry and unpainted.

b. Remove low pressure fuel filter from engine.

c. Position engine-to-transmission support on engine and secure with six screws and lock washers. Torque two bottom screws to 26-32 lb ft. Torque four top screws to 67-80 lb ft.

d. Install low pressure fuel filter on engine.

5-61. Tachometer Cable and Adapter Installation

Install tachometer adapter and cable on rear of engine. Refer to TM 9-2300-216-20 for installation procedures.

5-62. Warning Switches and Transmitters Installation

(Fig. 5-4)

Install transmission oil temperature transmitter, transmission high oil temperature warning switch, water high temperature warning switch, water temperature transmitter, engine oil pressure transmitter and adapter and low oil pressure warning switch in engine. Refer to TM 9-2300-216-20 for installation procedures.

5-63. Starter Control Solenoid Relay Installation

Install starter control solenoid relay on front of engine. Refer to TM 9-2300-216-20 for installation procedures.

5-64. Power Plant Reservoir Installation

Install power plant reservoir, breather and drain tube to engine oil cooler. Refer to TM 9-2300-216-20 for installation procedures.

5-65. Transmission Oil Cooler Hoses and Fittings Installation

Install transmission oil cooler hoses and fittings on engine oil cooler and power plant reservoir. Refer to TM 9-2300-216-20 for installation procedures.

5-66. Engine External Oil Hoses and Fittings Installation

Install engine external oil hoses and fittings on engine oil cooler and power plant reservoir. Refer to TM 9-2300-216-20 for installation procedures.

5-67. Engine Exhaust Pipe Installation

Install engine exhaust pipe and valve on turbocharger regulator. Refer to TM 9-2300-216-20 for installation procedures.

5-68. Engine Exhaust Manifold Elbow Installation

Install exhaust manifold elbow and valve on turbocharger. Refer to TM 9-2300-216-20 for installation procedures.

5-69. Fuel Hoses and Fittings Installation

Install fuel hoses and fittings to low pressure fuel filter, engine fuel return connection, high pressure fuel filter and power plant reservoir. Refer to TM 9-2300-216-20 for installation procedures.

5-70. Fuel System Purge and Prime Solenoid and Hoses Installation, "B" Vehicles

Install fuel system purge and prime solenoid and hoses. Refer to TM 9-2300-216-20 for installation procedures.

5-71. Aeration Detector Installation, "B" Vehicles

Install aeration detector on engine. Refer to TM 9-2300-216-20 for installation procedures.

5-72. Wiring Harness and Lead Installation

(Fig. 5-4).

a. All Vehicles.

(1) Connect starter electrical lead to starter and place lead across front of engine against engine-to-transmission support.

(2) Connect relay-to-starter and neutral position switch harness to starter solenoid relay, and starter solenoid. Place harness against engine-to-transmission support and neutral position switch connection on side of engine.

(3) Connect electrical components and warning units harness to air box heater bracket, transmission high oil temperature switch, transmission oil temperature transmitter, water temperature transmitter, water high temperature warning switch, engine oil pressure transmitter and engine low oil pressure warning switch. Place harness against engine-to-transmission support.

(4) Tie, as required, three harnesses and leads and tachometer cable together with retaining straps.

(5) Secure harnesses, leads and tachometer cable to engine-to-transmission support with harness cover and two screws.

b. "B" Vehicles.

(1) Install aeration detector diode assembly connector assembly in reverse order of removal (para 5-13).

(2) Install aeration detector diode assembly in reverse order of removal (para 5-13).

(3) Install aeration detector-to-line disconnect wiring harness in reverse order of removal (para 5-13).

5-73. Vibration Coupling Installation

(Fig. 5-3)

a. Make sure mating surfaces of engine, vibration coupling and mass ring are clean and free of paint.

b. Install vibration coupling and mass ring on crankcase end of engine and secure with 12 self-locking screws. Torque screws to 45 ± 5 lb ft.

c. Install new preformed packing on end of vibration coupling.

5-74. Engine Oil Filters Installation

Install engine oil filters on transmission (para 5-54).

Section XI. POWER PLANT ASSEMBLY FROM MAJOR COMPONENTS

5-75. General

This section contains instructions for assembly of the power plant from its three major components, engine, transmission and power take-off assembly.

5-76. Power Take-Off Installation on Transmission Transfer

(Fig. 5-2)

a. Remove cover (PN 19207-8351751) over power take-off access opening in transfer case. Retain screws. Remove and discard gasket.

b. Install new gasket over locating dowels on power take-off.

NOTE

Failure to use gasket (5330-00-736-0226; P/N 10906242) will damage the power take-off unit.

c. Position power take-off on transfer case and tap case onto dowels with soft face hammer to seat in transfer case.

d. Secure power take-off to transmission transfer with eight screws and lock washers. Tighten screws securely.

5-77. Engine Installation on Transmission

Remove turbocharger and exhaust tubing from engine. Install engine to transmission and connect hoses, wiring harnesses and support in reverse order of removal (para 5-4).

Section XII. TEST AND ADJUSTMENT

5-78. Engine

Refer to TM 9-2815-202-34 for detailed test and adjustment procedures on the engine.

5-79. Transmission

Refer to TM 9-2520-234-35 for detailed test and adjustment procedures on the transmission.

5-80. Power Plant

Refer to TM 9-2300-216-20 for adjustment procedures on the shifting controls, brake controls and throttle controls when the power plant is installed in the vehicle.

Section XIII. POWER TAKE-OFF REPAIR STANDARDS

5-81. Repair Standards

Repair standards for the power take-off are listed in table 5-1 and illustrated on figure 5-10. The reference letters on the illustration are shown in the second column of the table. Each item in the table indicates the point of measurement or inspection, part name, size and fit of new part, wear limits, and code symbols to coordinate information. Wear limits indicate that point to which a part or parts may be worn, before replacement, in order to obtain maximum service with minimum replacement. The suffix letter L indicates a loose or clearance fit between two parts. The suffix letter T indicates a tight or interference fit between two parts. The asterisk (*) indicates that tolerances on an individual part must be the same as on a new part. The double asterisk (**) indicates that the part may be used by selective fitting, provided that the mating part permits the fit required between the two parts. Clean grease from surfaces and wet mating surfaces with sealing compound Grade B, Specification MIL-S-22473.

Table 5-1. Power Take-Off Repair Standards

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
5-10	A	ID of idler spur gear bearing	1.5743 to 1.5748	*
5-10	A-P	Fit of idler spur gear bearing ID to OD of idler spur gear bolt	0.0001T to 0.0010L	0.0040
5-10	B	OD of idler spur gear bearing	3.1491 to 3.1496	*
5-10	B-D	Fit of bearing carrier bore ID to OD of bearing	0.0015T to 0.0002L	0.0002L
5-10	C-J	Backlash of power take-off idler spur gear to power take-off output gear	0.0030 to 0.0110	0.0300
5-10	D	ID of bearing carrier bore in idler spur gear (2 places)	3.1481 to 3.1493	**
5-10	E	ID of bearing bore in gearcase	5.1181 to 5.1191	5.1210
5-10	E-F	Fit of output gearcase bearing OD to ID of case bearing bore	0.000T to 0.0018L	0.0037L
5-10	F	OD of gearcase output bearing	5.1173 to 5.1181	*
5-10	G	ID of output gearcase bearing	3.3457 to 3.3465	*
5-10	G-H	Fit of gearcase output bearing surface OD to ID of bearing	0.0015T to 0.0001T	**
5-10	H	OD of gearcase output bearing surface on output gear	3.3466 to 3.3472	*
5-10	K	OD of output gear-to-cover bearing surface on output gear	2.9534 to 2.9529	2.9519
5-10	K-L	Fit of bearing ID to OD of output gear bearing surface	0.0012T to 0.0001T	0.0010L
5-10	L	ID of output gear-to-cover bearing	2.9522 to 2.9528	*
5-10	M	OD of output gear-to-cover bearing	4.5268 to 4.5276	*
5-10	M-N	Fit of output gear-to-cover bearing OD to ID of cover bearing bore	0.0000T to 0.0017L	0.0028L
5-10	N	ID of bearing bore in gear case cover	4.5276 to 4.5285	4.5296
5-10	P	OD of spur gear bolt	1.5738 to 1.5744	1.5698

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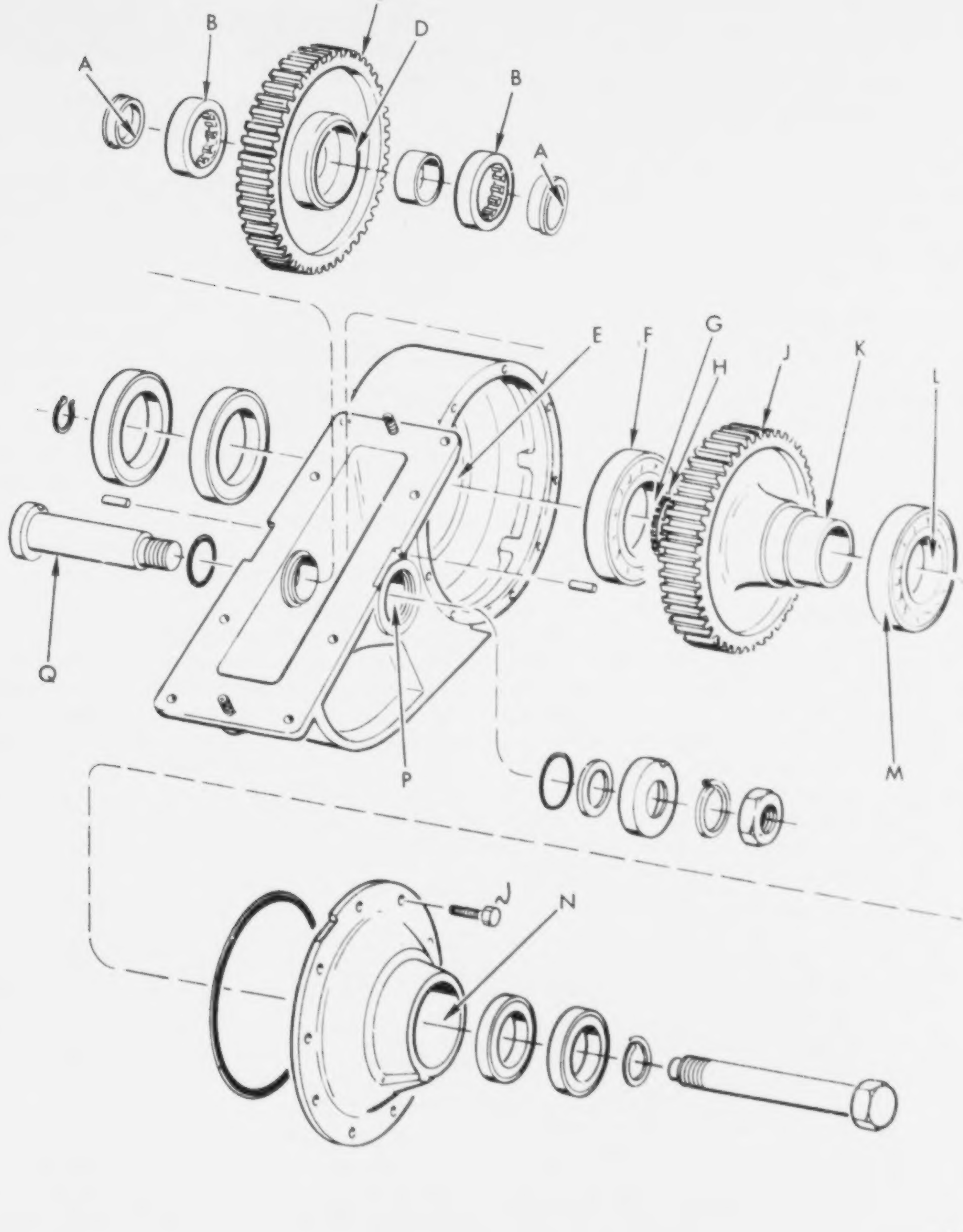

A
B
C
D
B
A
E
F
G
H
J
K
L
Q
P
M
N
J

AT 46323

Figure 5-10. Power take-off measurement and inspection points.

5-82. Torque Values

Screws are torqued to standard values except as listed in table 5-2.

Table 5-2. Power Plant Torque Values

Fig no.	Ref. letter	Location	Torque lbs-ft
5-3	—	Mass ring to engine crankcase self-locking screws	45 ± 5
5-5	—	Engine mount to engine screws	38-40
5-5	—	Engine-to-transmission support to engine two bottom screws	26-32
5-5	—	Engine-to-transmission support to engine four top screws	67-80

CHAPTER 6
AUXILIARY DRIVE ASSEMBLY REPAIR

Section I. DESCRIPTION AND DATA

6-1. Description and Operation

The auxiliary drive assembly provides coupling for engine power to drive the engine generator, engine cooling fan and the pumps of the hydraulic system. The M107 and M110/M110A1 "B" vehicles are provided with an improved auxiliary drive assembly equipped with a heavier duty and more easily maintained magnetic clutch and drive shaft. Coupling of engine power is provided by a power take-off assembly attached to the transmission input transfer assembly and coupled to the auxiliary drive by means of a drive shaft/universal joint assembly. The auxiliary drive consists of an input drive, differential type gear box directly coupled to a generator drive, an output drive gear and a clutch driveshaft coupled to a 4 fan belt drive sheave, and a magnetic drive clutch. The auxiliary drive operates directly with engine operation, providing constant driving of the electrical generator and cooling fan.

Power is provided to the hydraulic rotary pump whenever the magnetic drive clutch is energized, coupling the auxiliary drive to the hydraulic pump drive shaft. Energizing of the magnetic drive clutch is controlled by a power switch located on the driver's switch panel.

6-2. Data

Manufacturer	Pacific Car and Foundry Company Renton, Washington
Military number, "A" vehicles	11617771
"B" vehicles	11675634
Weight	191 lbs
Input to generator output shaft ratio	1:2.3125
Input fan sheave output shaft ratio	1:0.69
Magnetic clutch:	
Voltage	24V DC
Ampere at 25°C	4.76
Resistance at 20°C	5.04 ohms

Section II. AUXILIARY DRIVE SUBASSEMBLIES DISASSEMBLY AND ASSEMBLY

6-3. General

This section contains instructions for disassembly of the auxiliary drive into its major subassemblies and reassembly from its major subassemblies. Repair of the auxiliary drive assembly is allocated to general support maintenance personnel. Refer to paragraph 1-2. Refer to TM 9-2300-216-20 for removal and installation of the auxiliary drive in the vehicle. Repair of the auxiliary drive major subassemblies is described in subsequent sections in this chapter.

6-4. Auxiliary Drive Disassembly

a. Connecting Rod Removal.

(1) Remove self-locking nut, screw and flat washer securing connecting rod to magnetic clutch housing.

(2) Remove connecting rod.

b. Oil Fill Tube and Mounting Plate Removal.

(1) Remove two nuts, two screws and clamp holding oil fill tube to mounting plate (A, fig. 6-1).

(2) Unscrew nut retaining fill tube to union and remove fill tube.

(3) Remove union and preformed packing from input drive housing (B, fig. 6-1).

(4) Remove lock wire and two cap screws securing mounting plate to output drive housing and remove mounting plate (A, fig. 6-1).

c. Oil Drain Tube Removal.

(1) Provide suitable container, remove cap from drain tube and drain oil from auxiliary drive.

(2) Unscrew nut retaining drain tube to elbow and remove tube. Remove elbow and cap from tube (B, fig. 6-1).

(3) Loosen packing nut and remove elbow nut and preformed packing from input drive housing (B, fig. 6-1).

d. Drive Magnetic Clutch Subassembly Removal.

(1) Straighten tangs on lock washer. Using wrench (NSN 5120-00-793-7896), remove retaining nut and lock washer securing drive clutch subassembly to clutch shaft (C, fig. 6-1).

(2) Grasp magnetic clutch subassembly firmly and pull from drive shaft (D, fig. 6-1).

e. Clutch Driveshaft and Output Drive Gear Subassembly Removal.

(1) Remove lock wire and four remaining cap screws securing output drive gear housing and driveshaft housing to input drive housing (E, fig. 6-1).

(2) Separate output drive gear housing from input gear housing by using three of removed cap screws as jackscrews (E, fig. 6-1). Remove jackscrews.

(3) Remove output drive gear housing, driveshaft housing and adjusting shim (F, fig. 6-1).

f. Output Drive Gear Subassembly Removal.

(1) Remove lock wire and eight cap screws retaining driveshaft housing to output drive gear housing (G, fig. 6-1).

(2) Remove retaining ring from output drive gear end of clutch shaft (G, fig. 6-1).

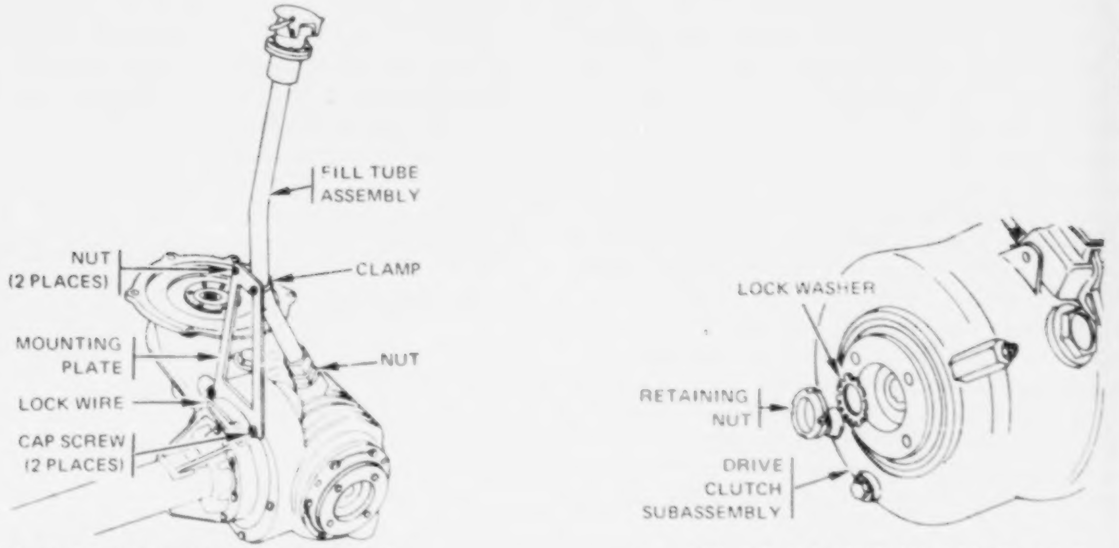
(3) Pull output drive gear housing from clutch shaft. Remove and discard gasket (G, fig. 6-1).

g. Generator Drive Subassembly Removal.

(1) Remove lock wire and eight cap screws securing generator drive gearcase to input drive housing (H,

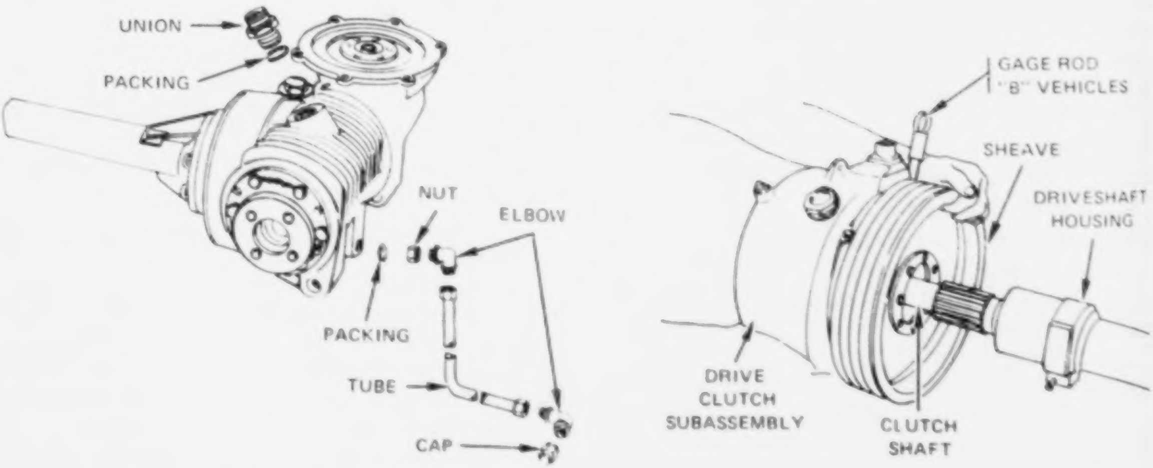
fig. 6-1).

(2) Separate generator drive subassembly and input drive subassembly and remove shims. Remove and discard preformed packing (H, fig. 6-1).


FILL TUBE ASSEMBLY
NUT (2 PLACES)
CLAMP
MOUNTING PLATE
NUT
LOCK WIRE
CAP SCREW (2 PLACES)
LOCK WASHER
RETAINING NUT
DRIVE CLUTCH SUBASSEMBLY

A. LOCKWIRE, CAP SCREWS, FILL PIPE, CLAMP, MOUNTING PLATE, AND NUT.

C. BEARING, LOCK NUT, AND BEARING LOCK WASHER

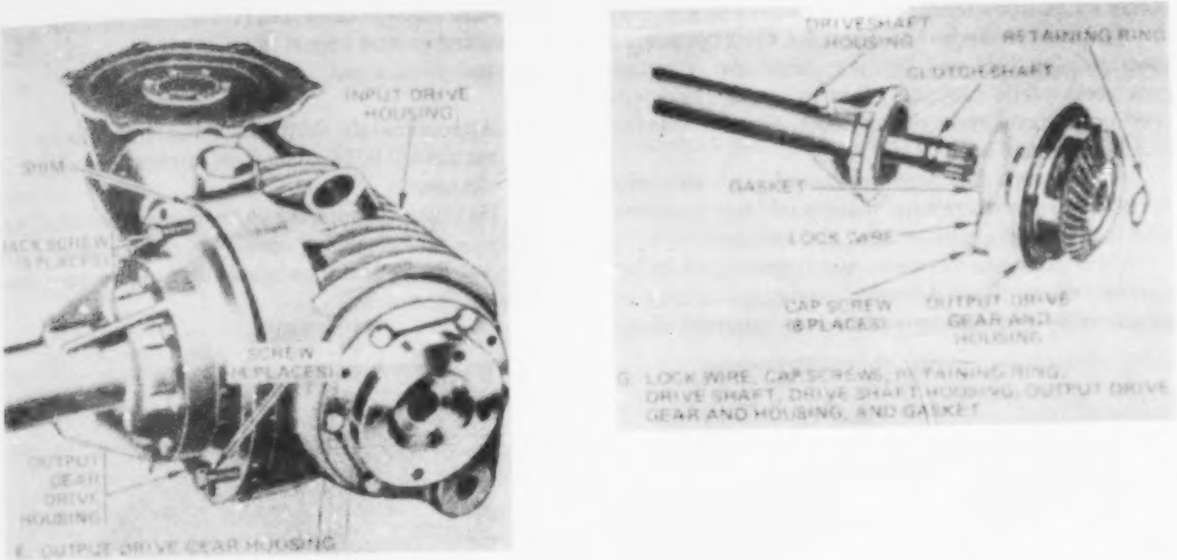

UNION
PACKING
NUT
ELBOW
PACKING
TUBE
CAP
GAGE ROD "B" VEHICLES
SHEAVE
DRIVESHAFT HOUSING
DRIVE CLUTCH SUBASSEMBLY
CLUTCH SHAFT

B. UNION, PACKINGS, ELBOWS, NUT, TUBE AND CAP.

D. DRIVE CLUTCH SUBASSEMBLY.

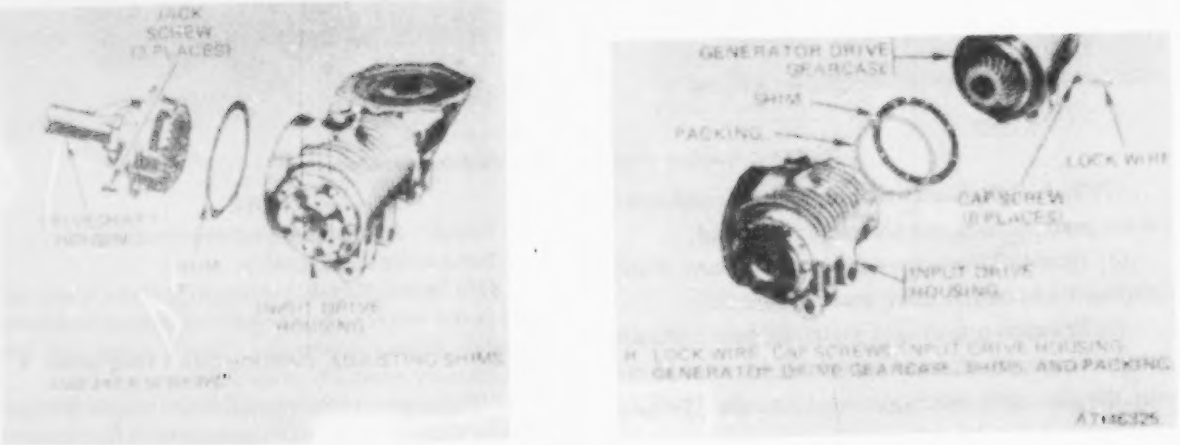
TA 030314

Figure 6-1. Auxiliary drive disassembly or assembly (sheet 1 of 2).


INPUT DRIVE HOUSING
SHIM
JACK SCREW (3 PLACES)
SCREW (4 PLACES)
OUTPUT GEAR DRIVE HOUSING
DRIVESHAFT HOUSING
RETAINING RING
CLUTCH SHAFT
GASKET
LOCK WIRE
CAP SCREW (8 PLACES)
OUTPUT DRIVE GEAR AND HOUSING

E. OUTPUT DRIVE GEAR HOUSING

G. LOCK WIRE, CAP SCREWS, RETAINING RING, DRIVE SHAFT, DRIVE SHAFT HOUSING, OUTPUT DRIVE GEAR AND HOUSING, AND GASKET


JACK SCREW (3 PLACES)
DRIVESHAFT HOUSING
SHIM
INPUT DRIVE HOUSING
GENERATOR DRIVE GEARCASE
SHIM
PACKING
LOCK WIRE
CAP SCREW (8 PLACES)
INPUT DRIVE HOUSING

F. [illegible] ADJUSTING SHIMS AND JACK SCREWS

H. LOCK WIRE, CAP SCREWS, INPUT DRIVE HOUSING, GENERATOR DRIVE GEARCASE, SHIMS, AND PACKING

AT46325

Figure 6-1. Auxiliary drive disassembly or assembly (sheet 2 of 2).

6-5. Auxiliary Drive Assembly

a. Generator Drive Subassembly Installation.

(1) Measure and record generator drive subassembly dimensions C and B and input drive housing dimensions J and H as shown on figure 6-3.

(2) Determine thickness of shim (L) required to mount generator drive gearcase by calculation with formula $L = C + K - (B + H + \frac{J}{2})$ using mounting distance K as etched on spiral pinion gear.

(3) Install shim on face of generator drive gearcase (H, fig. 6-1).

(4) Install preformed packing in groove of gearcase (H, fig. 6-1).

(5) Install generator drive gearcase on input drive housing and secure with eight cap screws. Tighten screws and secure screws with lock wire (H, fig. 6-1).

b. Output Drive Gear Subassembly Installation.

(1) Install gasket on driveshaft housing (G, fig. 6-1).

(2) Mate splines and install clutch drive shaft through output drive gear and install retaining ring on end of shaft (G, fig. 6-1).

(3) Seat output drive gear subassembly on driveshaft housing and gasket and secure with eight cap screws. Tighten cap screws and secure screws with lock wire (G, fig. 6-1).

c. Clutch Driveshaft and Output Drive Gear Subassembly Installation.

(1) Install one shim on output drive gear (A, fig. 6-2).

(2) Install clutch driveshaft and output drive gear subassembly into input drive housing and temporarily

secure with three evenly spaced cap screws (A, fig. 6-2).

(3) Insert lead wire through input drive housing inspection plug hole and between large end of output gear teeth while rotating gears by hand. Lead wire need only travel through one tooth. Reverse rotation and remove lead wire (B, fig. 6-2).

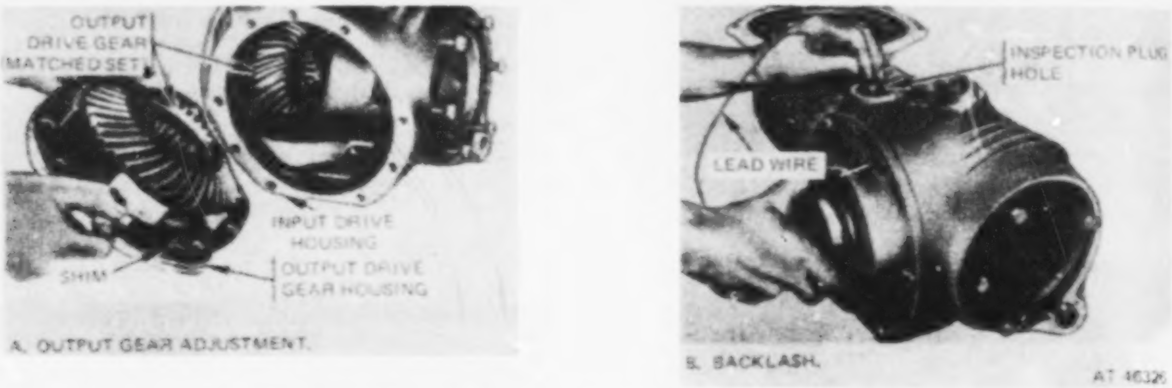
(4) Measure flattened portion of lead wire with micrometer to determine backlash measurement. Backlash should measure 0.005 to 0.006 inch.

(5) If backlash between output gear teeth is not correct, remove clutch driveshaft and output drive gear subassembly and increase or decrease number of shims. Reinstall clutch drive shaft and output drive gear subassembly and repeat step (4) above until proper backlash is obtained.

NOTE

Approximately 0.001 inch backlash change requires 0.0016 inch (one lamination) shim change.

(6) Clean output gear teeth of any residual oil and apply suitable marking compound on four or five output gear teeth. Use input shaft opening in input drive housing for access.



A. OUTPUT GEAR ADJUSTMENT.

B. BACKLASH.

Figure 6-2. Auxiliary drive installation backlash measurement.

(7) Turn clutch shaft counterclockwise and rotate output gears at least one complete revolution.

(8) Remove three cap screws and remove clutch driveshaft and output drive gear subassembly.

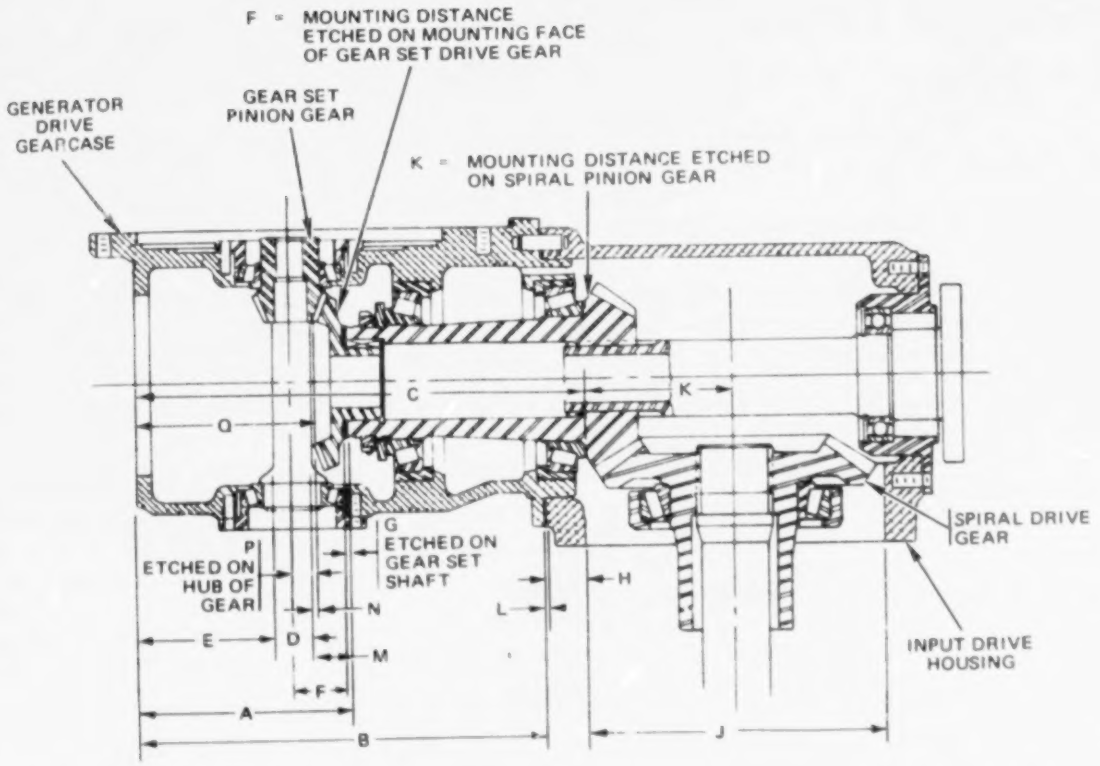
(9) Examine output gear matching gear teeth and determine gear tooth wear pattern. If backlash is correct, the gear tooth bearing contact area shall be equal in length to 0.5 ± 0.2 inch face lengths and centered on tooth face within 10 percent of length and width respectively (fig. 6-4).

NOTE

Contact areas extending to either end of the teeth are not acceptable.

(10) Repeat steps (1) through (9) above if wear pattern is not correct. If wear pattern cannot be achieved through proper shimming, check generator drive subassembly assembly procedures (para 6-34).

(11) Secure clutch driveshaft and output drive gear subassembly to input drive housing with four screws in bottom holes. Tighten screws and secure with lock wire (E, fig. 6-11). If present, remove screw in top screw holes.


F = MOUNTING DISTANCE ETCHED ON MOUNTING FACE OF GEAR SET DRIVE GEAR
GENERATOR DRIVE GEARCASE
GEAR SET PINION GEAR
K = MOUNTING DISTANCE ETCHED ON SPIRAL PINION GEAR
C
K
Q
P
ETCHED ON HUB OF GEAR
G
ETCHED ON GEAR SET SHAFT
SPIRAL DRIVE GEAR
H
N
L
E
D
M
INPUT DRIVE HOUSING
F
A
B
J

G = THICKNESS OF SHIM

$G = A - (E + \frac{D}{2} + F)$ OR $G = M + \frac{D}{2} - F$ AFTER ASSEMBLY CHECK

L = THICKNESS OF SHIM

$L = C + K - (B + H + \frac{J}{2})$

$P = N + \frac{D}{2}$ OR $P = Q - (E + \frac{D}{2})$

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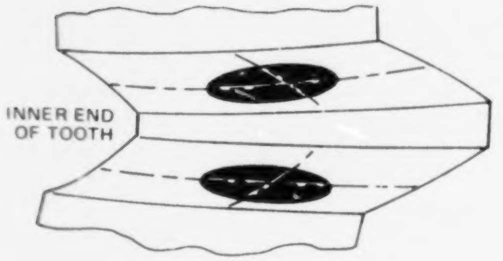
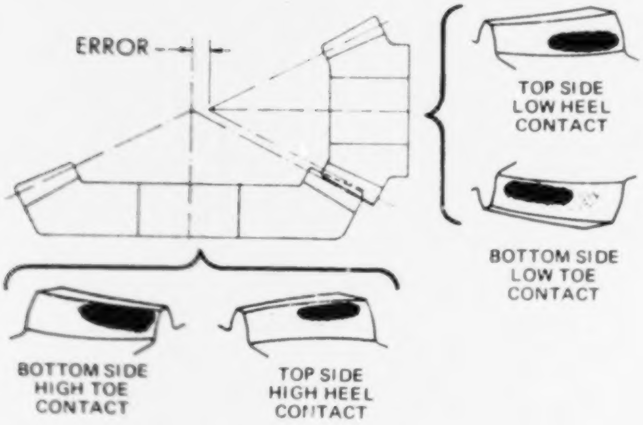
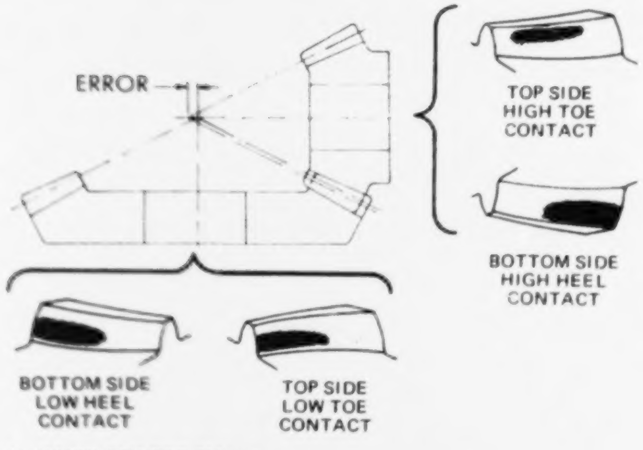
Figure 6-3. Determination of shim thickness for assembly of auxiliary drive


INNER END
OF TOOTH

A. CORRECT TOOTH CONTACT PATTERN.


ERROR
TOP SIDE
LOW HEEL
CONTACT
BOTTOM SIDE
LOW TOE
CONTACT
BOTTOM SIDE
HIGH TOE
CONTACT
TOP SIDE
HIGH HEEL
CONTACT

B. BACKLASH TOO LARGE.


ERROR
TOP SIDE
HIGH TOE
CONTACT
BOTTOM SIDE
HIGH HEEL
CONTACT
BOTTOM SIDE
LOW HEEL
CONTACT
TOP SIDE
LOW TOE
CONTACT

C. BACKLASH TOO SMALL.

Figure 6-4. Bevel gear tooth contact pattern.

d. Input Shaft and Bearing Carrier Subassembly Installation.

(1) Install preformed packing in groove of input drive housing (D, fig. 6-11).

(2) Install input shaft and gear carrier subassembly in input drive housing (C, fig. 6-11). Make sure shaft splines mate properly with output drive pinion gear.

(3) Secure input shaft and bearing carrier subassembly to input gear housing with six cap screws. Tighten cap screws and secure with lockwire (A, fig. 6-11).

e. Drive Magnetic Clutch Subassembly Installation.

(1) Apply antiseize compound, Specification MIL-A-907, to splines and mating surfaces of clutch shaft, clutch shaft sleeve and clutch bearing collar.

(2) Install drive clutch subassembly on clutch shaft. Make sure shaft splines mate properly with shaft sleeve (D, fig. 6-1).

(3) Secure drive clutch to clutch shaft with lock washer and retaining nut. Tighten retaining nut to 130 ± 20 lb ft torque using wrench (NSN 5120-00-793-7896). Bend tang of lock washer against retaining nut (C, fig. 6-1).

f. Oil Fill Tube and Mounting Plate Installation.

(1) Install mounting plate on output drive gear and secure to input drive housing with two cap screws. Tighten screws and secure screws with lock wire (A, fig. 6-1).

(2) Install new preformed packing and union in input drive housing (B, fig. 6-1).

(3) If new oil fill tube is required, install union nut, packing and sleeve on end of fill pipe (fig. 6-5).

(4) Position oil fill tube on union and against mounting plate. Secure fill tube to union with retaining nut. Secure fill tube to mounting plate with clamp, two screws and two nuts (A, fig. 6-1).

g. Oil Drain Tube Installation.

(1) Install new preformed packing, packing nut, and drain elbow in input drive housing drain hole (B, fig. 6-1).

(2) Install drain tube, elbow and cap on drain elbow.

h. Connecting Rod Installation.

(1) Position connecting rod on magnetic clutch housing.

(2) Secure connecting rod with screw, flat washer and self-locking nut.

6-6. Painting and Lubrication

a. Clean and paint any damaged paint areas. Apply one coat of rust inhibiting primer (Federal Specification TT-P-659) to bare surfaces requiring paint. Allow primer to dry a minimum of 30 minutes. Apply enamel paint to match existing color (white enamel, Federal Specification TT-E-489) to primed surfaces.

b. Lubricate auxiliary drive in accordance with LO 9-2300-216-12.

6-7. Test

Test auxiliary drive in accordance with procedures in paragraph 6-41.

Section III. OIL FILL TUBE AND MOUNTING PLATE REPAIR.

6-8. Oil Fill Tube and Mounting Plate

a. Disassembly.

(1) Remove six screws and lock washers securing gage rod cap to fill pipe (fig. 6-5).

(2) Remove gage rod cap and preformed packing.

NOTE

Do not attempt to remove nut and sleeve from pipe.

b. Cleaning.

(1) Clean oil fill tube parts and mounting plate with dry-cleaning solvent (SD-2).

(2) Wipe parts dry or dry with low pressure compressed air.

c. Inspection and Repair.

(1) Inspect mounting plate for cracks and for distortion. Straighten or replace if defective.

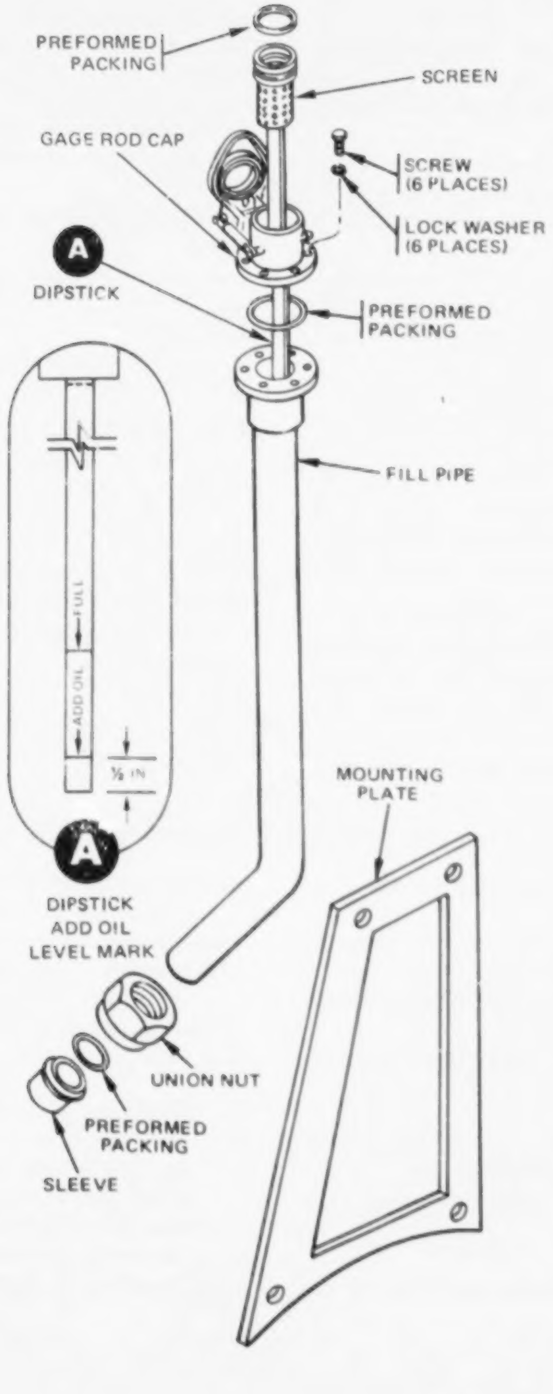
(2) Inspect gage rod cap assembly for damaged hinge, broken springs or bent cap. Replace gage and cap assembly if damaged.

(3) Inspect fill pipe for cracks, dents or stripped threads in cap attaching screw holes. Inspect union nut and sleeve for damage. If damaged, replace fill pipe.

CAUTION

Check the oil dipstick in the auxiliary drive unit for location of ADD OIL level mark (A, fig. 7-5). If level mark is not ½ inch above end of dipstick, replace dipstick with new screen assembly (NSN 2530-00-274-4502).

d. Assembly. Assembly of oil fill tube is reverse order of disassembly (*a* above).


PREFORMED PACKING
SCREEN
GAGE ROD CAP
SCREW (6 PLACES)
LOCK WASHER (6 PLACES)
A
DIPSTICK
PREFORMED PACKING
FILL PIPE
FULL
ADD OIL
½ IN
MOUNTING PLATE
A
DIPSTICK ADD OIL LEVEL MARK
UNION NUT
PREFORMED PACKING
SLEEVE

TA 011808

Figure 6-5. Auxiliary drive oil fill tube disassembly or assembly.

Section IV. MAGNETIC DRIVE CLUTCH SUBASSEMBLY REPAIR

6-9. General

This section contains instructions for disassembly, cleaning, repair and assembly of the magnetic drive clutch subassembly.

6-10. Magnetic Drive Clutch Subassembly Disassembly, "A" Vehicles

a. Remove housing fill plug and preformed packing and drain oil from drive clutch (A, fig. 6-6).

b. Remove lock wire and eight cap screws securing clutch and drive shaft sheave to clutch end housing and remove sheave (A, fig. 6-6).

c. Remove pressure relief breather and two lubrication fittings (C, fig. 6-6).

d. Remove lock wire and four cap screws securing electrical receptacle to clutch housing. Loosen receptacle (B, fig. 6-6).

e. Remove lock wire and ten cap screws securing clutch end housing to clutch housing. Use two cap screws as jack screws to loosen clutch end housing (C, fig. 6-6).

NOTE

Clutch end housing is installed on clutch housing with sealing compound.

f. Remove clutch end housing and magnetic clutch with electrical receptacle from clutch housing (D, fig. 6-6).

g. Remove clutch output flange from clutch housing (F, fig. 6-6).

h. Use a soft metal rod and tap free and remove two bearings and collar from clutch output flange (G, fig. 6-6).

i. Remove and discard two plain seals from clutch housing (J, fig. 6-6).

j. Lay magnetic clutch on clutch end housing and remove retaining ring from clutch shaft sleeve (L, fig. 6-6).

k. Use a soft wood block and gently tap retaining ring end of clutch shaft sleeve to free sleeve from magnetic clutch (M, fig. 6-6).

l. Lift clutch shaft sleeve, spacer and key from magnetic clutch. Remove key and spacer from sleeve (N, fig. 6-6).

NOTE

If key does not come out with the clutch sleeve, remove key from clutch.

m. Use pry bar with rolling head and remove and discard two grease seals. Remove ring spacer from clutch end housing (P, fig. 6-6).

NOTE

Spacer is installed with sealing compound.

n. Remove six machine screws securing cluch end housing to magnetic clutch and remove housing (T and U, fig. 6-6).

NOTE

Screws are installed with sealing compound.

o. Unsolder electrical leads from electrical receptacle connector contact pins and remove electrical receptacle.

p. Remove six machine screws securing adapter to magnetic clutch and remove adapter (X, fig. 6-6).

NOTE

Screws are installed with sealing compound.

q. Loosen six adjusting nuts and unscrew six adjusting screws securing pressure plate to clutch assembly and remove pressure plate (Z, fig. 6-6).

NOTE

At assembly, secure pressure plate in place but do not tighten adjusting screws. Adjust air gap after assembly (S, fig. 6-6).

r. Carefully lift and remove eight driving discs and eight friction disks with twelve release springs that are attached to friction discs, from clutch body (AA, fig. 6-6).

NOTE

At assembly, make sure that all release springs are firmly installed on friction discs and that all discs are installed in the same position as originally installed.

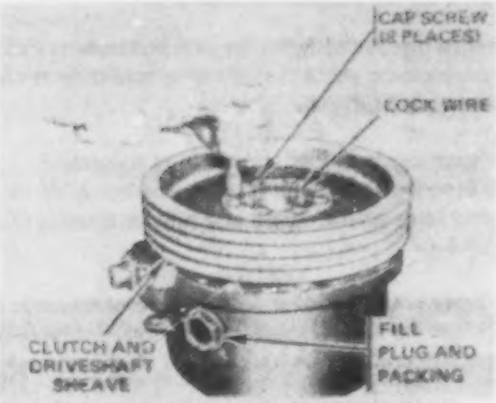
s. Remove six socket head screws and lock washers securing clutch body to magnet assembly and remove clutch body and outer field ring from magnet assembly (AB, fig. 6-6).

t. Provide suitable block supports under edge of armature and use improvised tool (fig. 2-4) to press housing-with-coil from bearing and armature (AC, fig. 6-6).

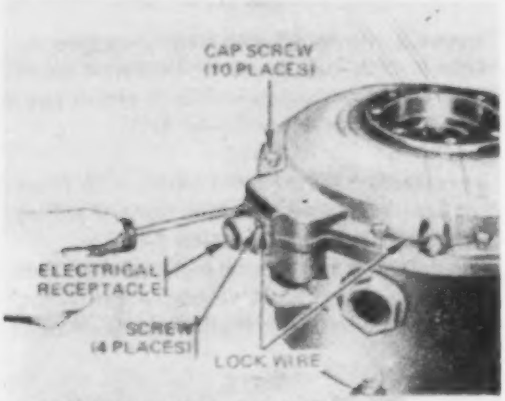
NOTE

At assembly, housing-with-coil will slide into bearing. Stake housing-with-coil eight places to secure bearing (AD, fig. 6-6).

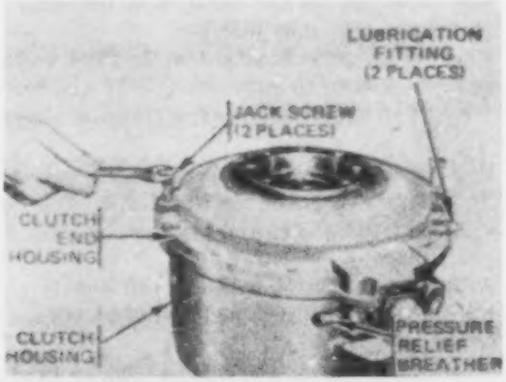
u. Use suitable puller and remove bearing from armature.


CAP SCREW (8 PLACES)
LOCK WIRE
CLUTCH AND DRIVESHAFT SHEAVE
FILL PLUG AND PACKING

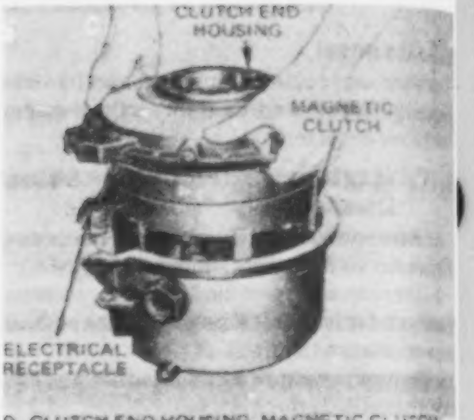
A. LOCK WIRE, CAP SCREWS, SHEAVE, PLUG AND PACKING.


CAP SCREW (10 PLACES)
ELECTRICAL RECEPTACLE
SCREW (4 PLACES)
LOCK WIRE

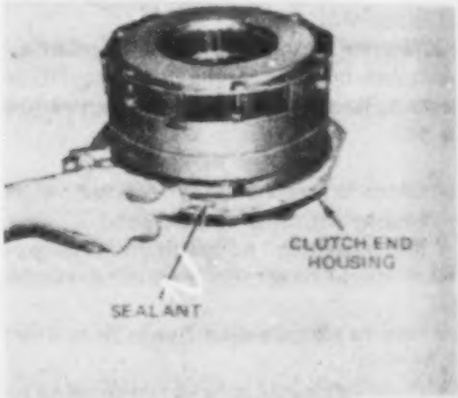
B. LOCKWIRE, SCREWS, CAP SCREWS, AND ELECTRICAL RECEPTACLE.


LUBRICATION FITTING (2 PLACES)
JACK SCREW (2 PLACES)
CLUTCH END HOUSING
CLUTCH HOUSING
PRESSURE RELIEF BREATHER

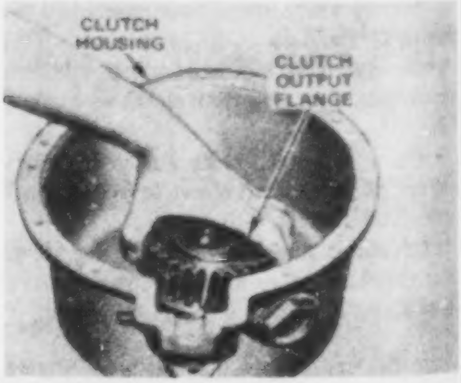
C. CLUTCH END HOUSING LUBRICATION FITTING, AND PRESSURE RELIEF BREATHER.


CLUTCH END HOUSING
MAGNETIC CLUTCH
ELECTRICAL RECEPTACLE

D. CLUTCH END HOUSING, MAGNETIC CLUTCH, AND ELECTRICAL RECEPTACLE.


CLUTCH END HOUSING
SEALANT

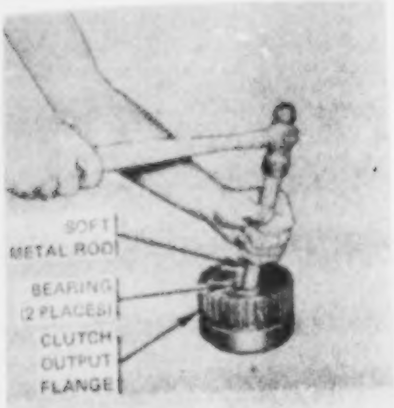
E. CLUTCH END HOUSING SEALANT.


CLUTCH HOUSING
CLUTCH OUTPUT FLANGE

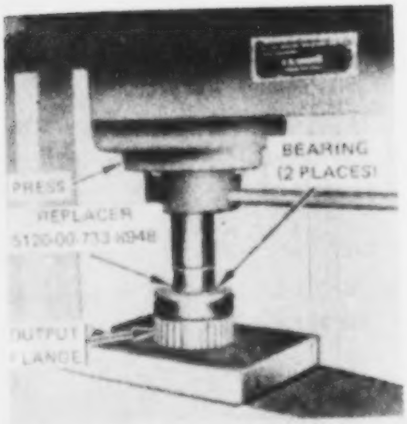
F. CLUTCH OUTPUT FLANGE.

TA [illegible]

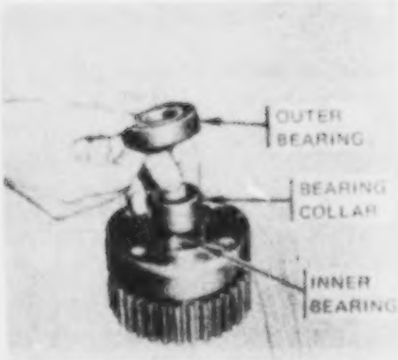
Figure 6-6. Magnetic drive clutch subassembly disassembly or assembly ("A" vehicles) (sheet 1 of 5).


SOFT METAL ROD
BEARING (2 PLACES)
CLUTCH OUTPUT FLANGE

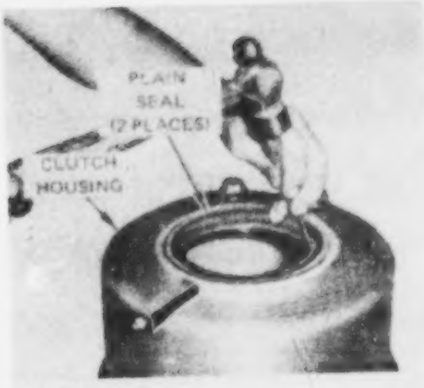
G. BEARINGS


PRESS
REPLACER 5120-00-733-6948
BEARING (2 PLACES)
OUTPUT FLANGE

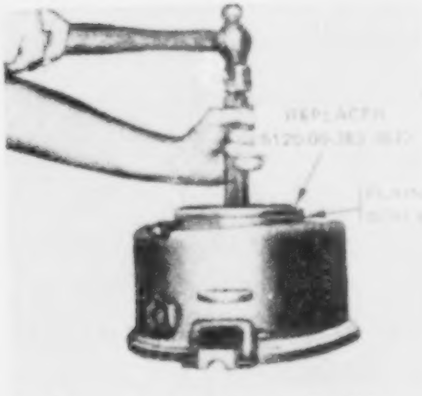
H. BEARINGS AND COLLAR INSTALLATION


OUTER BEARING
BEARING COLLAR
INNER BEARING

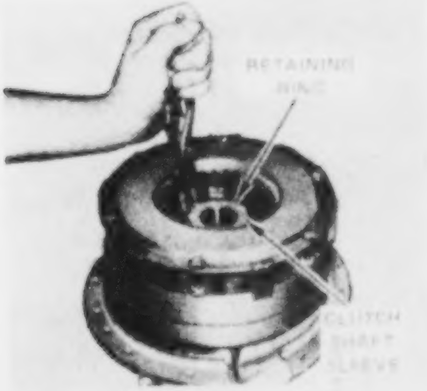
I. BEARINGS AND COLLAR


PLAIN SEAL (2 PLACES)
CLUTCH HOUSING

J. PLAIN SEALS


REPLACER 5120-00-383-9617
PLAIN SEALS

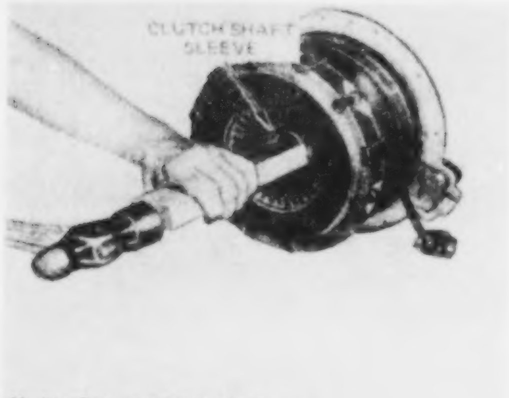
K. SEALS, SCREW, FLAT WASHER, AND SELF-LOCKING NUT INSTALLATION


RETAINING RING
CLUTCH SHAFT SLEEVE

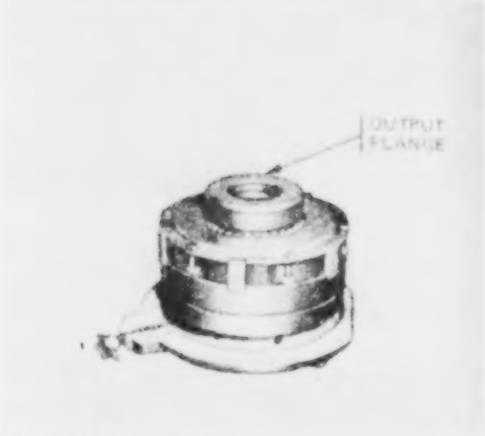
L. RETAINING RING

TA 030316

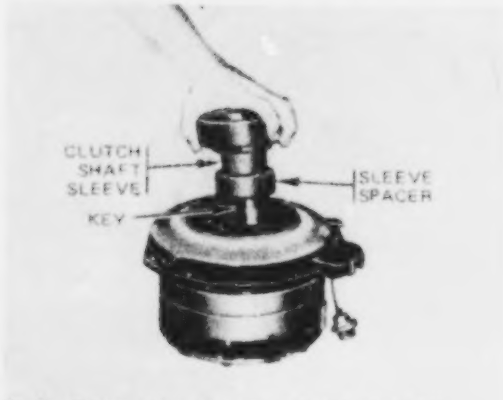
Figure 6-6. Magnetic drive clutch subassembly disassembly or assembly ("A" vehicles) (sheet 2 of 5).


CLUTCH SHAFT SLEEVE

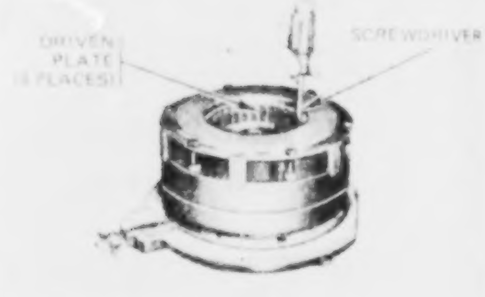
M. CLUTCH SHAFT SLEEVE


OUTPUT FLANGE

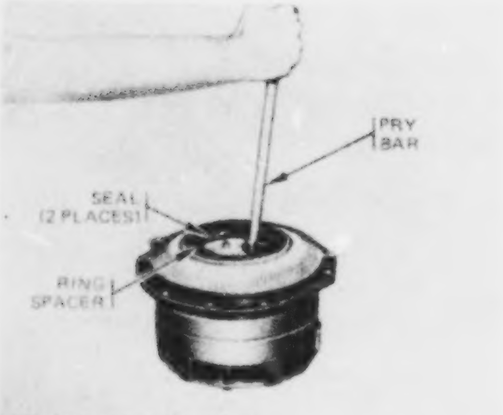
Q. OUTPUT FLANGE


CLUTCH SHAFT SLEEVE
SLEEVE SPACER
KEY

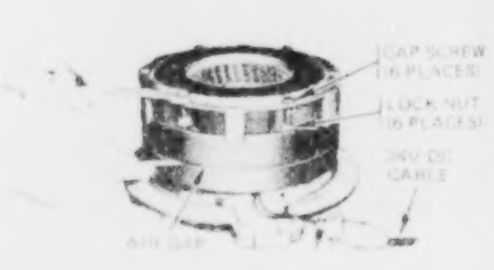
N. CLUTCH SHAFT SLEEVE, SPACER AND KEY


DRIVEN PLATE (3 PLACES)
SCREWDRIVER

R. DRIVEN PLATES ALIGNMENT


PRY BAR
SEAL (2 PLACES)
RING SPACER

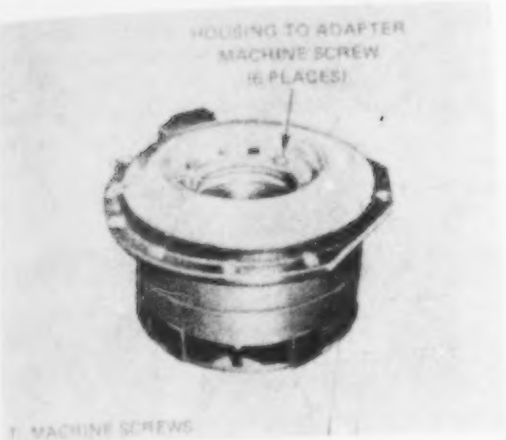
P. SEALS AND RING SPACER


CAP SCREW (6 PLACES)
LOCK NUT (6 PLACES)
24V DC CABLE
AIR GAP

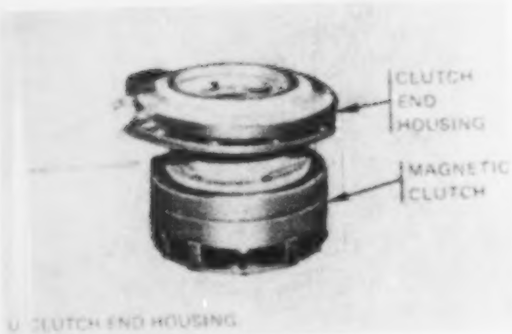
S. MAGNETIC CLUTCH AIR GAP ADJUSTMENT

A.T. 46332

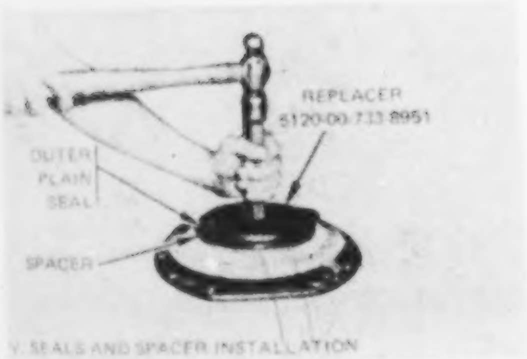
Figure 6-6. Magnetic drive clutch subassembly disassembly or assembly ("A" vehicles) (sheet 3 of 5).


HOUSING TO ADAPTER
MACHINE SCREW
(6 PLACES)

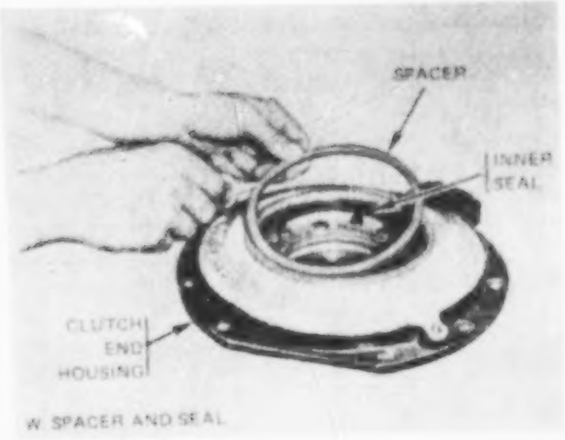
T. MACHINE SCREWS


CLUTCH
END
HOUSING
MAGNETIC
CLUTCH

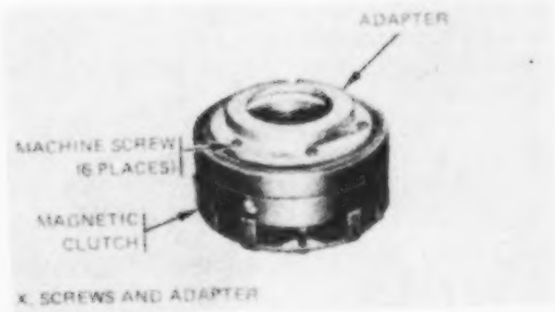
U. CLUTCH END HOUSING


REPLACER
5120-00-733-8951
OUTER
PLAIN
SEAL
SPACER

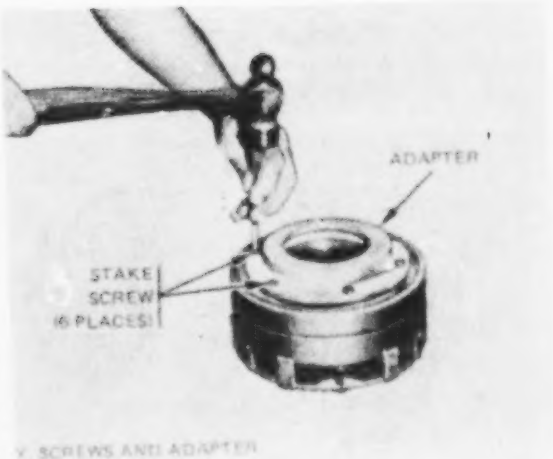
V. SEALS AND SPACER INSTALLATION


SPACER
INNER
SEAL
CLUTCH
END
HOUSING

W. SPACER AND SEAL


ADAPTER
MACHINE SCREW
(6 PLACES)
MAGNETIC
CLUTCH

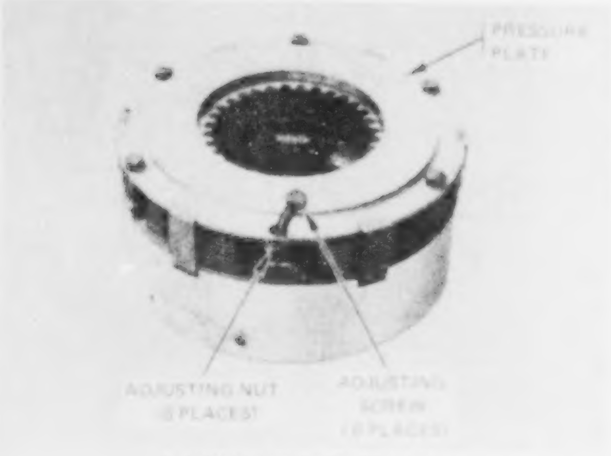
X. SCREWS AND ADAPTER


ADAPTER
STAKE
SCREW
(6 PLACES)

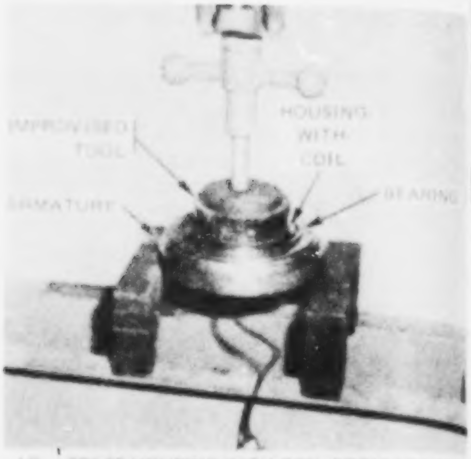
Y. SCREWS AND ADAPTER

TA 090317

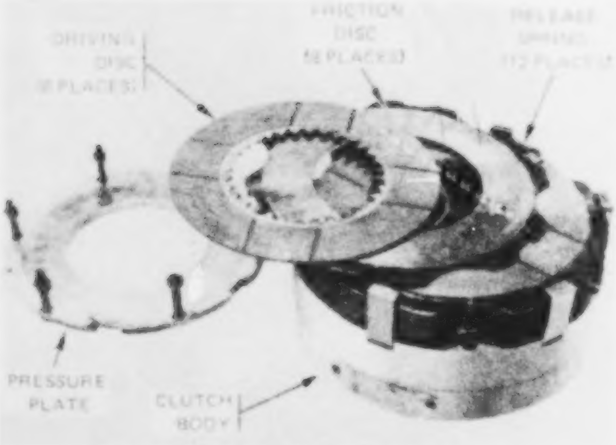
Figure 6-6. Magnetic drive clutch subassembly disassembly or assembly ("A" vehicles) (sheet 4 of 5)


PRESSURE PLATE
ADJUSTING NUT (8 PLACES)
ADJUSTING SCREW (8 PLACES)

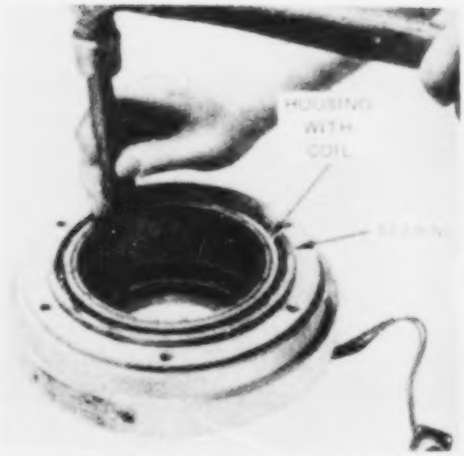
Z. REMOVE PRESSURE PLATE


IMPROVISED TOOL
HOUSING WITH COIL
ARMATURE
BEARING

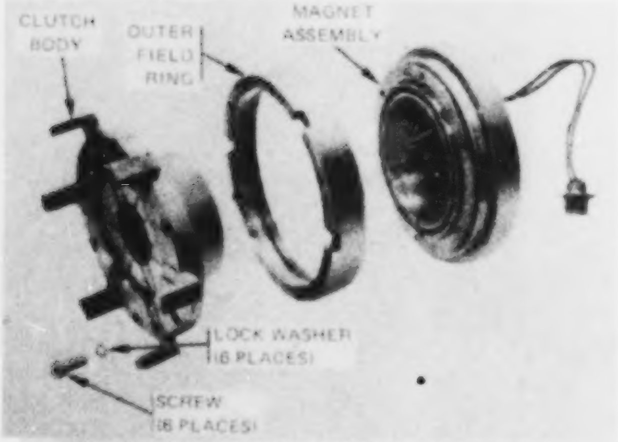
AC. PRESS HOUSING WITH COIL FROM BEARING AND ARMATURE


DRIVING DISC (8 PLACES)
FRICTION DISC (8 PLACES)
RELEASE SPRING (12 PLACES)
PRESSURE PLATE
CLUTCH BODY

AA. REMOVE DRIVING DISCS, FRICTION DISCS AND RELEASE SPRINGS


HOUSING WITH COIL
BEARING

AD. STAKE HOUSING WITH COIL EIGHT PLACES TO SECURE BEARING


CLUTCH BODY
OUTER FIELD RING
MAGNET ASSEMBLY
LOCK WASHER (8 PLACES)
SCREW (8 PLACES)

AB. REMOVE CLUTCH BODY AND OUTER FIELD RING FROM MAGNET ASSEMBLY.

TA 011809

Figure 6-6. Magnetic drive clutch subassembly disassembly or assembly ("A" vehicles) (sheet 5 of 5).

6-11. Magnetic Drive Clutch Subassembly Disassembly, "B" Vehicles

(Fig. 6-7)

a. Remove housing fill plug and preformed packing and drain oil from drive clutch (A).

b. Remove lock wire and eight cap screws securing clutch and drive shaft sheave to clutch end housing and remove sheave (A).

c. Remove lock wire and four cap screws securing electrical receptacle to clutch housing. Loosen receptacle (B).

d. Remove gage rod, packing and unscrew tube from housing (B).

e. Remove pressure relief breather and two lubrication plugs (C).

f. Remove lock wire and 10 cap screws securing clutch end housing to clutch housing. Use two cap screws as jack screws to loosen clutch end housing (C).

NOTE

Clutch end housing is installed on clutch housing with sealing compound.

g. Remove clutch end housing (D).

h. Remove magnetic clutch with electrical receptacle from clutch output flange and clutch housing (E).

i. Remove shaft spacer from output flange (E).

j. Remove clutch output flange from clutch housing (F).

k. Use a soft metal rod and tap free and remove outer bearing and spacer from clutch output flange (G). Turn clutch output flange over and use soft metal rod to tap free second bearing.

l. Remove six screws and retainer from clutch housing (I).

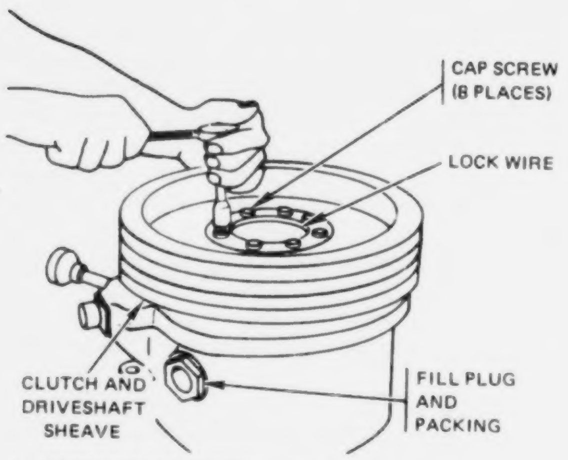
m. Remove seal, retaining ring, bearing, and shield from clutch housing using hammer puller (K). Discard seal.

n. Remove clutch end housing hub (L).

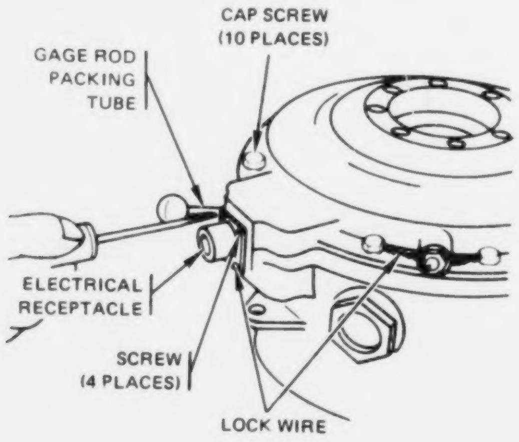
o. Remove six screws and retainer from clutch end housing (M).

p. Remove seal, retaining ring, bearing and shield from clutch end housing using puller (M). Discard seal.

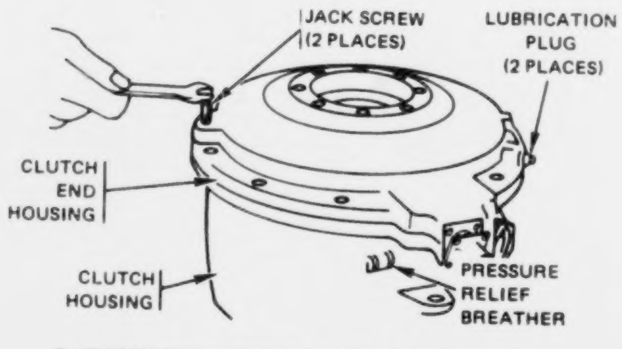
q. Unsolder electrical leads from electrical receptacle connector contact pins and remove electrical receptacle.


CAP SCREW
(8 PLACES)
LOCK WIRE
CLUTCH AND
DRIVESHAFT
SHEAVE
FILL PLUG
AND
PACKING

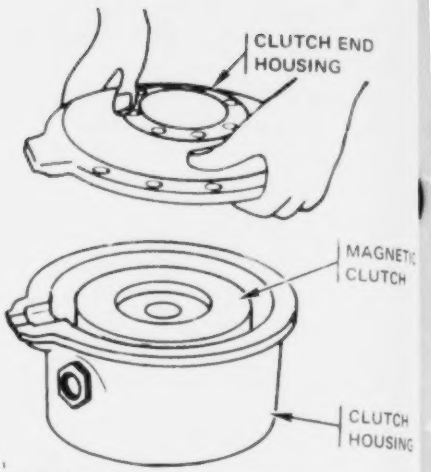
A. LOCK WIRE, CAP SCREWS, SHEAVE, PLUG AND PACKING.


CAP SCREW
(10 PLACES)
GAGE ROD
PACKING
TUBE
ELECTRICAL
RECEPTACLE
SCREW
(4 PLACES)
LOCK WIRE

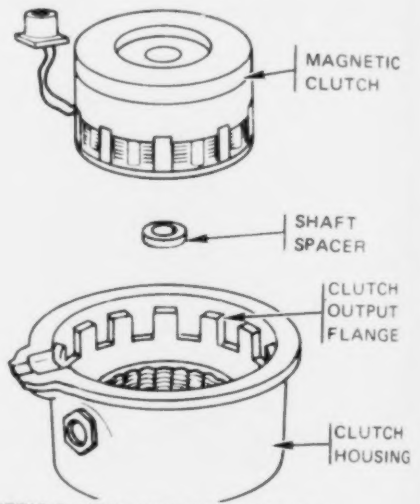
B. LOCK WIRE, SCREWS, CAP SCREWS, AND ELECTRICAL RECEPTACLE.


JACK SCREW
(2 PLACES)
LUBRICATION
PLUG
(2 PLACES)
CLUTCH
END
HOUSING
CLUTCH
HOUSING
PRESSURE
RELIEF
BREATHER

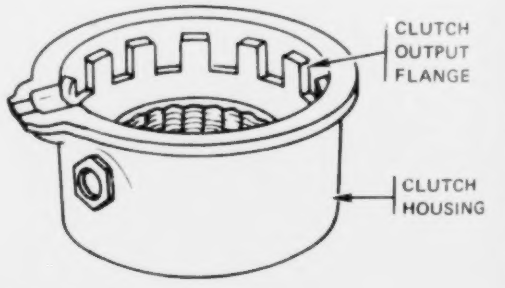
C. CLUTCH END HOUSING LUBRICATION PLUG AND PRESSURE RELIEF BREATHER.


CLUTCH END
HOUSING
MAGNETIC
CLUTCH
CLUTCH
HOUSING

D. CLUTCH END HOUSING, MAGNETIC CLUTCH, AND CLUTCH HOUSING.


MAGNETIC
CLUTCH
SHAFT
SPACER
CLUTCH
OUTPUT
FLANGE
CLUTCH
HOUSING

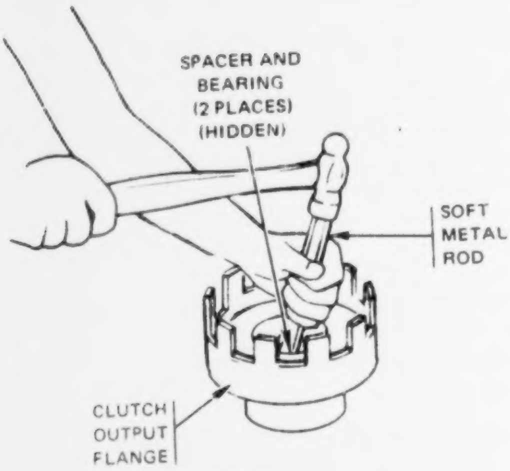
E. MAGNETIC CLUTCH AND SHAFT SPACER.


CLUTCH
OUTPUT
FLANGE
CLUTCH
HOUSING

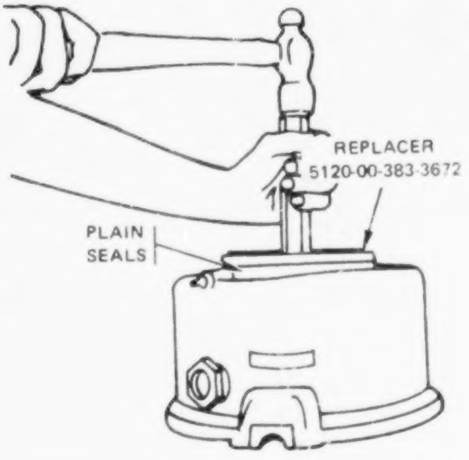
F. CLUTCH OUTPUT FLANGE.

TA 030318

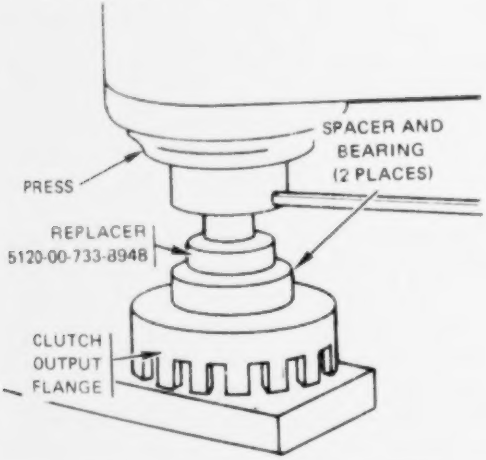
Figure 6-7. Magnetic drive clutch subassembly disassembly or assembly ("B" vehicles) (sheet 1 of 3).


SPACER AND BEARING (2 PLACES) (HIDDEN)
SOFT METAL ROD
CLUTCH OUTPUT FLANGE

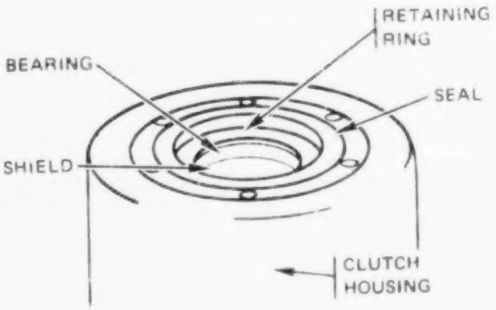
G. BEARINGS AND SPACER


REPLACER 5120-00-383-3672
PLAIN SEALS

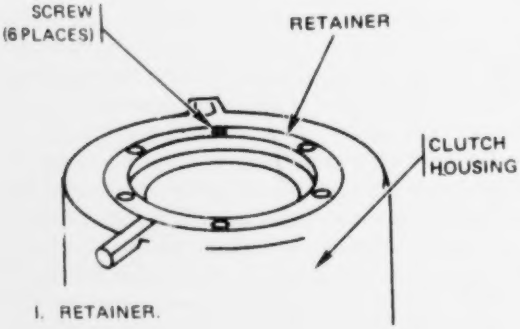
J. SEAL INSTALLATION.


SPACER AND BEARING (2 PLACES)
PRESS
REPLACER 5120-00-733-8948
CLUTCH OUTPUT FLANGE

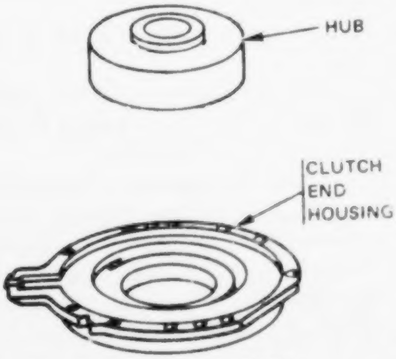
H. BEARINGS AND SPACER INSTALLATION.


RETAINING RING
BEARING
SEAL
SHIELD
CLUTCH HOUSING

K. SEAL, RETAINING RING, BEARING AND SHIELD.


SCREW (6 PLACES)
RETAINER
CLUTCH HOUSING

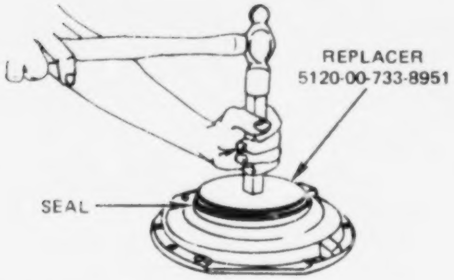
I. RETAINER.


HUB
CLUTCH END HOUSING

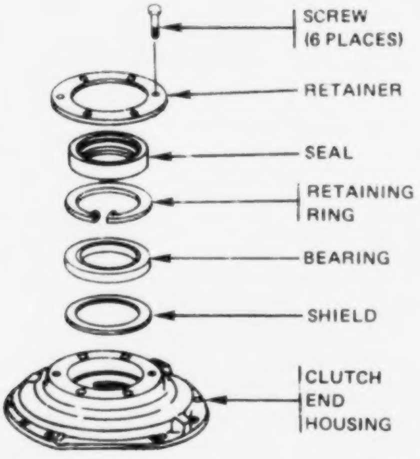
L. CLUTCH END HOUSING AND HUB.

TA 030319

Figure 6-7. Magnetic drive clutch subassembly disassembly or assembly ("B" vehicles) (sheet 2 of 3).



N. SEAL INSTALLATION.



M. CLUTCH END HOUSING ASSEMBLY/DISASSEMBLY.

TA 030320

Figure 6-7. Magnetic drive clutch subassembly disassembly or assembly ("B" vehicles) (sheet 3 of 3).

6-12. Cleaning

a. Clean all metal parts with dry-cleaning solvent (SD-2).

b. Remove sealing compound with alcohol.

c. Clean bearings in accordance with TM 9-214.

CAUTION

Do not spin bearings with compressed air.

d. Dry all parts with low pressure compressed air.

e. Remove rust or corrosion from non-bearing surfaces with solvent (SD-2), wire brush and crocus cloth.

f. Coat unpainted parts and mating surfaces with lubricating oil (OE/HDO) to prevent corrosion or rusting.

6-13. Inspection

a. Inspect all parts for physical damage, breaks, pits, cracks, sharp ragged edges, deformation, rusted or deteriorated areas, scoring and for chipped or cracked paint.

b. Inspect bearing as prescribed in TM 9-214.

c. Inspect threaded areas for damage or crossed threads.

d. Inspect splines for wear, chipped or cracked areas and bearing surfaces for wear and scratches.

e. Inspect magnetic clutch components visually for signs of excessive wear or warpage of clutch plates, evidence of arcing or over-heating. Lay clutch on stator end, spin rotor section by hand, and listen for grinding or grating noise. Note freedom and smoothness of rotation. Apply 24V DC to magnetic coil and check clutch operation.

f. Inspect and measure parts for wear in accordance with repair standards, table 6-1 and figure 6-12, "A" vehicles, and table 6-2 and figure 6-13, "B" vehicles.

6-14. Repair

a. Replace all seals, gaskets and preformed packings.

b. Remove housing nicks and burrs with file and polish with crocus cloth.

c. Replace bearings that do not meet acceptance standards of TM 9-214.

d. Replace all parts with components in repair kit 5703767, "B" vehicles.

e. Repair damaged threaded areas with tap or die.

f. Remove stake deformations from clutch housing-with-coil with fine mill file and polish with crocus cloth.

g. Replace defective non-repairable parts and parts worn beyond wear limits specified in repair standards (table 6-1, "A" vehicles, or table 6-2, "B" vehicles).

6-15. Magnetic Drive Clutch Subassembly Assembly, "A" Vehicles

CAUTION

An improperly installed seal will leak during operation.

a. Lightly lubricate seal cavities in clutch housing with grease (GAA) and install two new seals in housing using replacer (NSN 5120-00-383-3672). Make sure lip of inner seal is toward inside of housing and lip of outer seal is toward outside of housing (K, fig. 6-6).

b. Pack output flange bearings with grease (GAA). Place splined end of clutch output flange down and install outer bearing into flange with bearing replacer (NSN 5120-00-733-8948) and arbor press (H, fig. 6-6). Turn clutch output flange over and install bearing collar (I, fig. 6-6). Install inner bearing into flange with replacer (NSN 5120-00-733-8948) and arbor press. Pack space between bearings with grease (GAA).

c. Coat threads of six adapter machine screws with sealing compound, Grade H or HV, specification MIL-S-22473, and install adapter onto magnetic clutch. Tighten and stake each screw (Y, fig. 6-6).

CAUTION

An improperly installed seal will leak during operation.

d. Lightly lubricate clutch end housing seal cavities with grease (GAA) and install inner seal using replacer (NSN 5120-00-733-8951). Make sure lip of seal is toward inside of housing and that seal is seated evenly against shoulder (V, fig. 6-6).

e. Apply silicone rubber compound, RTV specification MIL-S-23586 or adhesive sealant, RTV specification MIL-S-46106, to outer edge of seal spacer (W. fig. 6-6) and install spacer in clutch end housing against inner seal.

f. Install outer seal in clutch end housing using replacer (NSN 5120-00-733-8951). Make sure lip of seal is toward outside of housing and that seal is seated evenly against spacer (V, fig. 6-6).

g. Position clutch end housing on magnetic clutch adapter, (U, fig. 6-6). Coat threads of six machine screws with sealing compound, Grade H or HV specification MIL-S-22473, install screws and secure housing to adapter. Stake screws in place (T, fig. 6-6).

h. Solder magnetic clutch leads to electrical receptacle connector contact pins in accordance with specification MIL-S-6872 using solder COMP SN60, specification QQ-S-571.

i. Install sleeve spacer and key on clutch shaft sleeve (N, fig. 6-6).

CAUTION

A nicked, scratched or cut seal lip will leak during operation.

j. Apply antiseize compound, specification MIL-A-907, to mating surfaces of sleeve and magnetic clutch. Install clutch shaft sleeve through clutch end housing into magnetic clutch (N, fig. 6-6). Make sure lip of clutch end housing outer seal is worked over edge of clutch shaft sleeve and points outward evenly.

k. Install retaining ring on end of clutch shaft sleeve (L, fig. 6-6).

l. Apply 24V DC power and energize magnetic clutch. Using feeler gage, measure clutch air gap at six points (S, fig. 6-6) Gap should be 0.022 ± 0.002 inch. If required, loosen six lock nuts and adjust gap with adjusting cap screws. Tighten lock nuts and check air gap at six points. Readjust if required. Remove 24V DC power source.

m. Using screwdriver or equivalent, carefully aline teeth of eight magnetic clutch driven plates (R, fig. 6-6).

n. Install output flange into magnetic clutch, oscillating flange slightly to facilitate meshing of flange gear teeth and driven plate teeth. Center output flange as accurately as possible using sleeve hole as guide (Q, fig. 6-6).

CAUTION

Make sure flange is fully inserted through all clutch plates.

o. Carefully remove output flange without disturbing driven plates. Connect 24V DC to magnetic clutch to hold clutch plates in place.

CAUTION

A nicked, scratched or cut seal lip will leak during operation.

p. Install output flange into clutch housing. Make sure that lip of inner seal is worked up and over edge of output flange and points inward evenly around flange (F, fig. 6-6).

q. Apply even coat of silicone rubber compound, RTV specification MIL-S-23586 or adhesive sealant RTV specification MIL-A-46106, to mating surfaces of clutch housing and clutch end housing (E, fig. 6-6).

WARNING

A strong magnetic field exists around the clutch magnet. When installing the clutch into the housing, make sure that fingers are clear of mating surfaces as the housing will be drawn forceably into the clutch.

r. Keep magnetic clutch energized. Grasp clutch by clutch end housing and lift clutch directly over housing. Carefully lower clutch into housing oscillating slightly to facilitate alinement of output flange teeth with clutch plate grooves (D, fig. 6-6).

s. Disconnect and remove 24V DC power source. Secure clutch end housing to clutch housing with ten cap screws. Tighten and lock wire screws (B, fig. 6-6).

t. Secure electrical receptacle to housing with four cap screws. Tighten and lock wire screws (B, fig. 6-6).

u. Install two lubrication fittings and pressure relief breather in housings (C, fig. 6-6).

v. Install clutch and drive shaft sheave on clutch and housing and secure with eight cap screws. Tighten and lock wire screws (A, fig. 6-6).

w. Fill clutch housing with oil in accordance with LO 9-2300-216-12. Install clutch housing preformed packing and fill plug (A, fig. 6-6).

6-16. Magnetic Drive Clutch Subassembly Assembly, "B" Vehicles

(Fig. 6-7)

a. Pack clutch housing bearing with grease (GAA). Install shield and bearing into clutch housing with bearing replacer (12253880) and arbor press (K).

b. Install bearing retaining ring into clutch housing (K).

CAUTION

An improperly installed seal will leak during operation.

c. Lightly lubricate seal cavity in clutch housing with grease (GAA) and install new seal in housing using replacer (NSN 5120-00-383-3672). Make sure lip of seal is toward inside of housing (J).

d. Install retainer and six screws into clutch housing. Stake each screw one place (I).

e. Pack clutch end housing bearing with grease (GAA). Install shield and bearing into clutch end housing with bearing replacer (12253880) and arbor press (M).

f. Install bearing retaining ring into clutch end housing (M).

CAUTION

An improperly installed seal will leak during operation.

g. Lightly lubricate seal cavity in clutch end housing with grease (GAA) and install new seal in end housing using replacer (NSN 5120-00-733-8951). Make sure lip of seal is toward inside of end housing (N).

h. Install retainer and six screws into clutch end housing. Stake each screw one place (M).

i. Pack clutch output flange bearings with grease (GAA). Place splined end of clutch output flange down and install outer bearing into flange with bearing replacer (NSN 5120-00-733-8948) and arbor press (H). Turn clutch output flange over and install bearing spacer (G). Pack space between spacer bearing and flange with grease (GAA). Install inner bearing into flange with replacer (NSN 5120-00-733-8948) and arbor press.

j. Solder magnetic clutch leads to electrical receptacle connector contact pins in accordance with spec MIL-S-6872 using solder COMP SN60, spec QQ-S-571.

k. Install output flange into clutch housing. Make sure that lip of inner seal is worked up and over edge of clutch output flange and points inward evenly around flange (F).

l. Place shaft spacer in output flange with external chamfer towards output flange (E).

CAUTION

A nicked, scratched or cut seal lip will leak during operation.

m. Install hub into clutch end housing. Make sure lip of seal is worked up and over edge of output flange and points inward evenly around flange (L).

n. Lift magnetic clutch directly over housing. Carefully lower clutch into housing oscillating slightly to facilitate alinement of output flange teeth with clutch plate grooves (E).

o. Apply even coat of silicone rubber compound, RTV (MIL-S-23586) or adhesive sealant RTV (MIL-A-46106) to mating surfaces of clutch housing and clutch end housing. Install clutch end housing on clutch housing and secure with 10 cap screws. Tighten screws securely and secure screws with lock wire (B).

p. Secure electrical receptacle to housing with four cap screws. Tighten and lock wire screws (B).

CAUTION

Do not overlubricate. Grease on clutch plates will cause plates to drag and overheat clutch.

q. Install two 5 lb pressure relief grease fittings (Alemite no. 1982-B or equivalent). Pack seal/bearing cavities with grease (GAA). Remove grease fittings and install two plugs (C).

r. Install tube, packing, and gage rod (B). Install pressure relief breather into housing (C).

s. Install clutch and drive shaft sheave on clutch end housing and secure with eight cap screws. Tighten screws and lock wire screws (A).

t. Fill clutch housing with oil in accordance with LO 9-2300-216-12. Install clutch housing preformed packing and fill plug (A).

Section V. CLUTCH DRIVE SHAFT SUBASSEMBLY REPAIR

6-17. General

This section contains instructions for disassembly, cleaning, inspection, repair and assembly of the clutch drive shaft subassembly. The clutch drive shaft subassembly is basically the same for the "A" and "B" vehicles, however, the drive shafts and bearing race are not interchangeable.

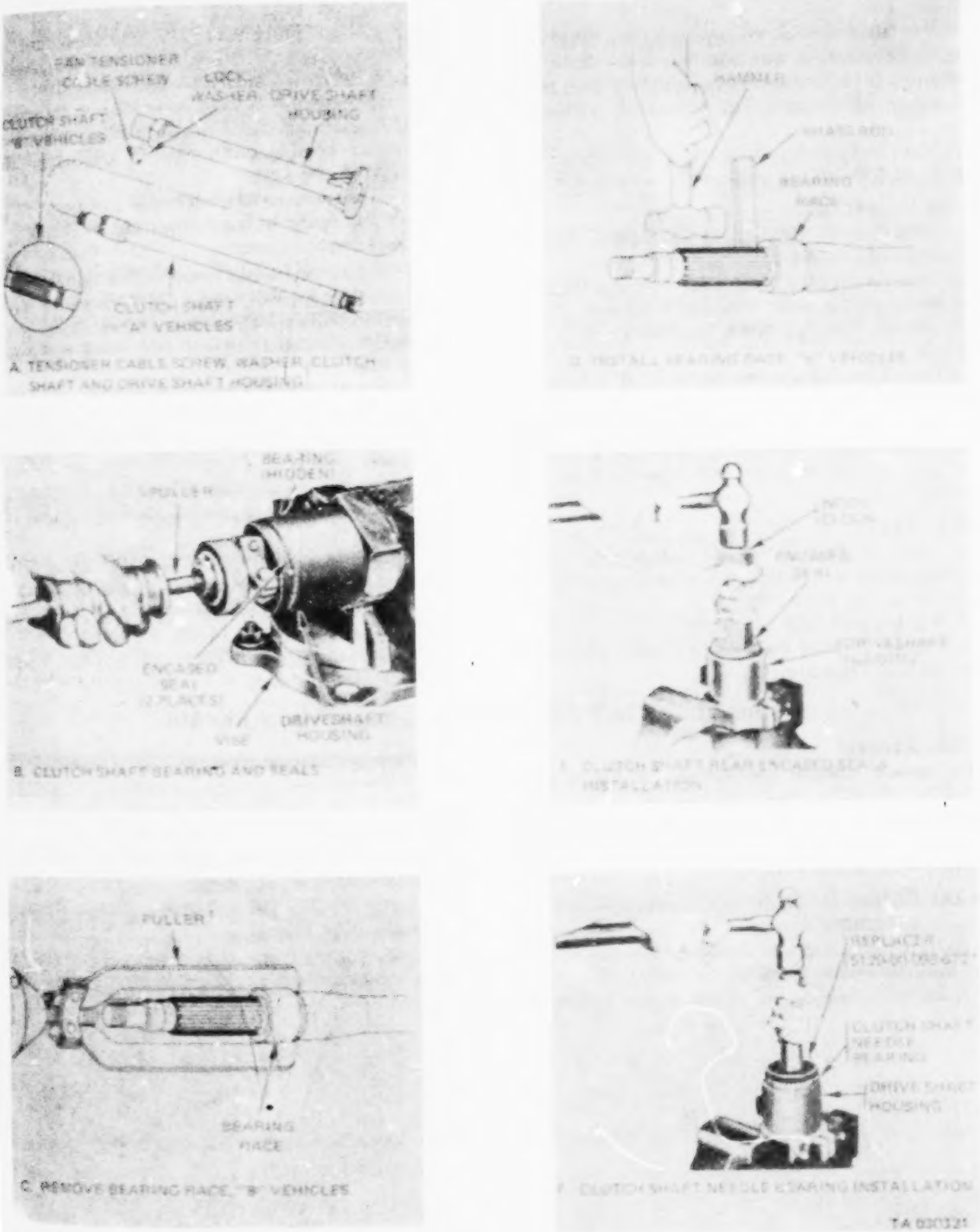
6-18. Clutch Drive Shaft Subassembly Disassembly

a. Pull clutch shaft from forward end of drive shaft housing and remove clutch shaft (A, fig. 6-8).

b. Remove fan tensioner cable screw and lock washer from drive shaft housing (A, fig. 6-8).

c. Using puller, remove two encased seals and needle bearing from drive shaft housing (B, fig. 6-8). Discard seals.

d. Using puller, remove bearing race from drive shaft clutch end, "B" vehicles (C, fig. 6-8).


FAN TENSIONER
CABLE SCREW
LOCK
WASHER
DRIVE SHAFT
HOUSING
CLUTCH SHAFT
"B" VEHICLES
CLUTCH SHAFT
"A" VEHICLES
HAMMER
BRASS ROD
BEARING
RACE
BEARING
(HIDDEN)
PULLER
ENCASED
SEAL
(2 PLACES)
VISE
DRIVESHAFT
HOUSING
ENCASED
SEAL
DRIVESHAFT
HOUSING
PULLER
BEARING
RACE
REPLACER
CLUTCH SHAFT
NEEDLE
BEARING
DRIVE SHAFT
HOUSING

A. TENSIONER CABLE SCREW, WASHER, CLUTCH SHAFT AND DRIVE SHAFT HOUSING

B. CLUTCH SHAFT BEARING AND SEALS

C. REMOVE BEARING RACE, "B" VEHICLES

D. INSTALL BEARING RACE, "B" VEHICLES

E. CLUTCH SHAFT REAR ENCASED SEALS INSTALLATION

F. CLUTCH SHAFT NEEDLE BEARING INSTALLATION

TA 030321

Figure 6-8. Clutch drive shaft subassembly disassembly or assembly.

6-19. Cleaning

a. Clean all metal parts with dry-cleaning solvent (SD-2).

b. Dry all parts with low pressure compressed air.

c. Remove rust or corrosion from non-bearing surfaces with dry-cleaning solvent (SD-2) and wire brush. Smooth area with crocus cloth. Rinse surface clean and dry.

d. Coat unpainted parts and mating surfaces with engine oil (OE/HDO) to prevent corrosion or rust.

6-20. Inspection

a. Inspect shaft and housing for physical damage, distortion and scoring.

b. Inspect splines for wear, chipped or cracked areas and bearing surfaces for wear and scratches.

c. Inspect threaded areas for damage or crossed threads.

d. Inspect bearing and bearing race ("B" vehicles) as prescribed in TM 9-214.

e. Inspect and measure parts for wear in accordance with repair standards, table 6-1 and figure 6-12 for "A" vehicles and table 6-2 and figure 6-13 for "B" vehicles.

6-21. Repair

a. Repair of clutch drive shaft subassembly consists of replacement of defective parts with new serviceable parts except for minor repairs.

b. Replace seals with new parts.

c. Replace bearing that does not meet acceptance standards of TM 9-214.

d. Replace all parts worn beyond wear limits specified in repair standards table 6-1 and figure 6-12 for "A" vehicles and table 6-2 and figure 6-13 for "B" vehicles.

6-22. Clutch Drive Shaft Subassembly

a. Lightly lubricate bearing surface with grease (GAA) and install clutch shaft needle bearing into drive shaft housing using replacer (NSN 5120-00-098-6727) (F, fig. 6-8).

CAUTION

> An improperly installed seal will leak during operation.

b. Install two drive shaft rear bearing encased seals into drive shaft housing using wood block. Install inner seal against bearing with open face of seal facing bearing. Install outer seal with open face of seal facing out (E, fig. 6-8).

c. Pack seal cavities with grease (GAA).

CAUTION

> A nicked, scratched or cut seal lip will leak during operation.

d. Use suitable brass tube or block and install bearing race on clutch end of clutch shaft, "B" vehicles, (D, fig. 6-8).

e. Install clutch shaft into drive shaft housing. Make sure that splines do not damage needle bearing and that lip of inner seal is worked over edge of clutch shaft and points inward evenly (A, fig. 6-8).

f. Install fan tensioner cable screw and lock washer (A, fig. 6-8).

Section VI. OUTPUT DRIVE GEAR SUBASSEMBLY REPAIR

6-23. General

This section contains instructions for disassembly, cleaning, inspection, repair and assembly of the output drive subassembly. The spiral drive gear is matched as a set with the generator drive subassembly spiral pinion gear in Section VII.

6-24. Output Drive Gear Subassembly Disassembly

a. Straighten tangs on retaining nut washer and remove gear retaining nut (B, fig. 6-9).

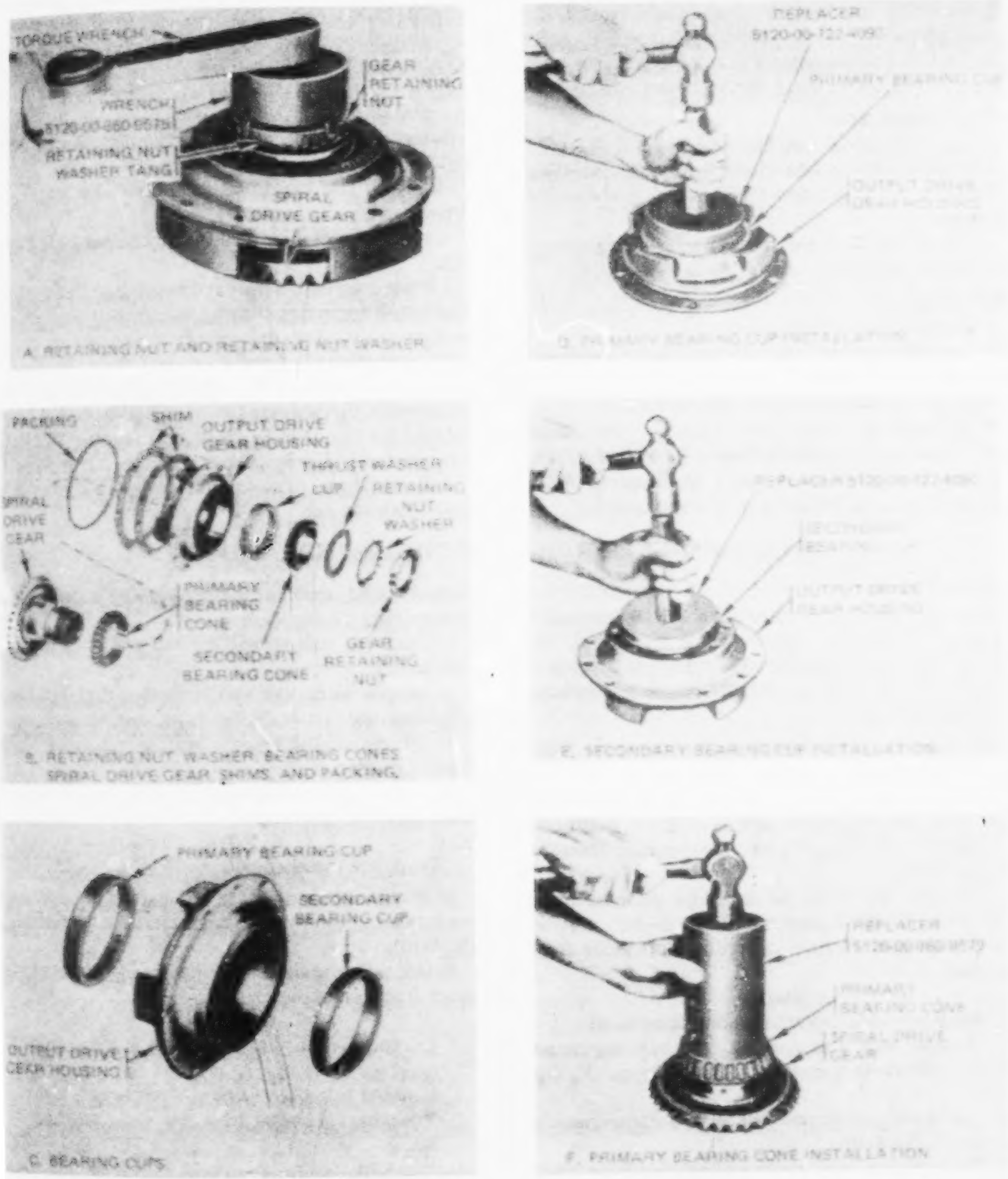
b. Remove retaining nut washer, thrust washer and secondary bearing cone from spiral drive gear shaft (B, fig. 6-9).

c. Pull spiral drive gear and primary bearing cone from output drive gear housing (B, fig. 6-9).

d. Remove and discard preformed packing from flange of housing (B, fig. 6-9).

e. Using bearing puller, remove primary bearing cone from spiral drive gear.

f. Using bearing puller, remove primary and secondary bearing cups from output drive gear housing (C, fig 6-9).


TORQUE WRENCH
WRENCH 5120-00-860-9578
GEAR RETAINING NUT
RETAINING NUT WASHER TANG
SPIRAL DRIVE GEAR
REPLACER 5120-00-722-4090
PRIMARY BEARING CUP
OUTPUT DRIVE GEAR HOUSING
PACKING
SHIM
OUTPUT DRIVE GEAR HOUSING
THRUST WASHER
CUP
RETAINING NUT WASHER
SPIRAL DRIVE GEAR
PRIMARY BEARING CONE
SECONDARY BEARING CONE
GEAR RETAINING NUT
REPLACER 5120-00-722-4090
SECONDARY BEARING CUP
OUTPUT DRIVE GEAR HOUSING
PRIMARY BEARING CUP
SECONDARY BEARING CUP
OUTPUT DRIVE GEAR HOUSING
REPLACER 5120-00-860-9579
PRIMARY BEARING CONE
SPIRAL DRIVE GEAR

A. RETAINING NUT AND RETAINING NUT WASHER.

D. PRIMARY BEARING CUP INSTALLATION.

B. RETAINING NUT, WASHER, BEARING CONES, SPIRAL DRIVE GEAR, SHIMS, AND PACKING.

E. SECONDARY BEARING CUP INSTALLATION.

C. BEARING CUPS.

F. PRIMARY BEARING CONE INSTALLATION.

TA-011610

Figure 6-9. Output drive gear subassembly disassembly or assembly.

6-25. Cleaning

a. Refer to TM 9-214 for instructions on cleaning antifriction bearings.

b. Clean all parts with dry-cleaning solvent (SD-2).

c. Dry parts with low pressure compressed air.

d. Coat unpainted parts and mating surfaces with engine oil (OE/HDO) to prevent corrosion or rust.

6-26. Inspection

a. Inspect bearings as prescribed in TM 9-214.

b. Inspect housing and spiral drive gear for wear, chipped or cracked areas and bearing surfaces for scratches.

c. Inspect and measure parts for wear in accordance with repair standards, table 6-3 and figure 6-14.

6-27. Repair

a. Replace preformed packing.

b. Replace bearings that do not meet acceptance standards of TM 9-214.

c. Repair damaged threaded areas with die.

d. Replace all parts worn beyond wear limits specified in repair standards, table 6-3 and figure 6-14.

e. Replace spiral drive gear and generator drive subassembly spiral pinion gear as a matched set.

6-28. Output Drive Gear Subassembly Assembly

a. Install primary bearing cone on spiral drive gear using replacer (NSN 5120-00-860-9579) (F, fig. 6-9).

b. Install secondary bearing cup in output drive gear housing using replacer (NSN 5120-00-722-4093) (E, fig. 6-9).

c. Install primary bearing cone in output drive gear housing using replacer (NSN 5120-00-722-4093) (D, fig. 6-9).

d. Install preformed packing into groove on output drive housing (B, fig. 6-9).

e. Install spiral drive gear in output drive gear housing.

f. Place gear end of gear end housing on flat surface and install secondary bearing cone, thrust washer, retaining nut' washer and gear retaining nut on spiral drive gear shaft (B, fig. 6-9).

g. Using wrench (NSN 5120-00-860-9575) and torque wrench, tighten gear retaining nut to preload bearings until a torque of 15-25 lb in. is required to rotate unmeshed spiral drive gear in housing (A, fig. 6-9).

h. Bend tang of retaining nut washer into grooves in gear retaining nut.

Section VII. GENERATOR DRIVE SUBASSEMBLY REPAIR

6-29. General

This section contains instructions for disassembly, cleaning, inspection, repair and assembly of the generator drive subassembly. The spiral pinion gear is matched as a set with the output drive gear subassembly spiral drive gear.

6-30. Generator Drive Subassembly Disassembly

a. Remove lock wire, eight cap screws and inspection plate from generator drive gearcase (A, fig. 6-10).

b. Remove and discard preformed packing from inspection plate.

c. Remove lock wire, six nuts and gearcase plate from generator drive gearcase (B, fig. 6-10).

d. If damaged, remove inspection plate studs from gearcase.

NOTE

Studs are installed with sealing compound.

e. Remove lock wire and six nuts securing upper bearing carrier to generator drive gearcase (C, fig. 6-10).

f. Use three jack screws and remove upper bearing carrier (D, fig. 6-10).

g. Remove shims and preformed packing from upper bearing carrier (E, fig. 6-10). Discard packing.

h. Use puller and remove seal from outer end of upper bearing carrier and bearing cup from inner end of bearing carrier. Discard seal

i. Remove lock wire and six nuts securing plate and lower bearing carrier to generator drive gearcase and remove plate (F, fig. 6-10).

j. Use three jack screws and remove lower bearing carrier.

k. Remove shims and two preformed packings from lower bearing carrier (F, fig. 6-10). Discard packings.

l. Use puller and remove bearing cup from lower bearing carrier.

m. If damaged, remove upper and lower bearing carrier studs from gearcase.

NOTE

Studs are installed with sealing compound.

n. Remove generator gear set shaft with upper and lower bearing cones from generator drive gearcase (K, fig. 6-10).

o. Use puller and remove upper and lower bearing cones from generator gear set shaft.

CAUTION

Do not remove pinion gear from generator gear set shaft unless gear set drive gear is replaced or replacement of shaft is required. The pinion gear and drive gear are a matched set.

p. Use puller and remove gear set pinion gear from generator gear set shaft (L, fig. 6-10).

q. Remove lock wire and six cap screws securing gear set drive gear to spiral pinion gear (M, fig. 6-10).

r. Use three jack screws and remove gearset drive gear (N, fig. 6-10).

s. Remove key and shim from drive gear (O, fig. 6-10).

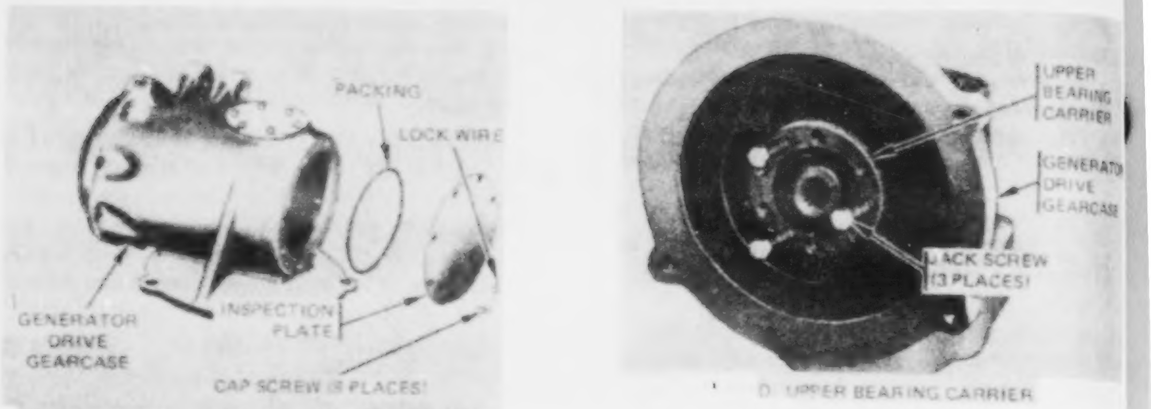
t. Straighten tangs on gear nut washer. Remove spiral pinion gear nut using wrench (NSN 5120-00-860-9575) (R, fig. 6-10).

u. Remove gear nut washer, bearing washer and thrust washer from spiral pinion gear (S, fig. 6-10).

v. Press spiral pinion gear out of gearcase (T, fig. 6-10). Remove pinion gear secondary bearing cone from case.

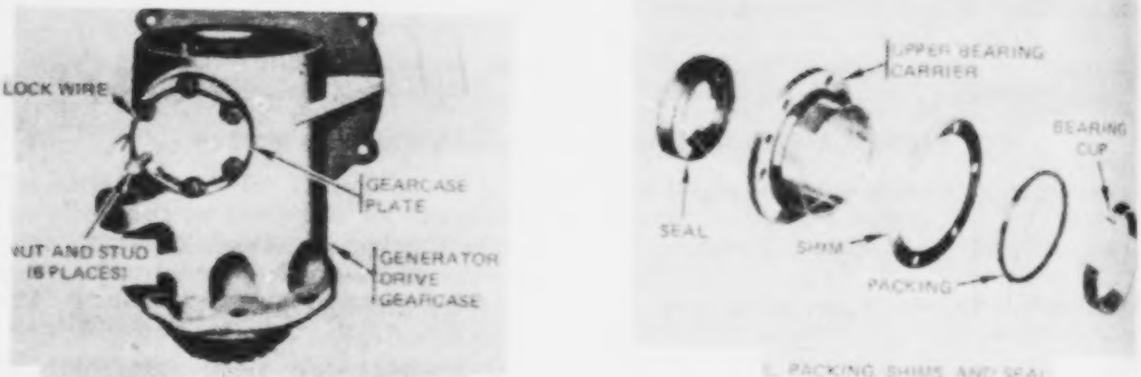
w. Use puller and remove spiral pinion gear primary bearing cone from spiral pinion gear (U, fig. 6-10).

x. Use puller and remove pinion gear primary and secondary bearing cups from generator gearcase (W, fig. 6-10).


PACKING
LOCK WIRE
GENERATOR DRIVE GEARCASE
INSPECTION PLATE
CAP SCREW (8 PLACES)
UPPER BEARING CARRIER
GENERATO DRIVE GEARCASE
JACK SCREW (3 PLACES)

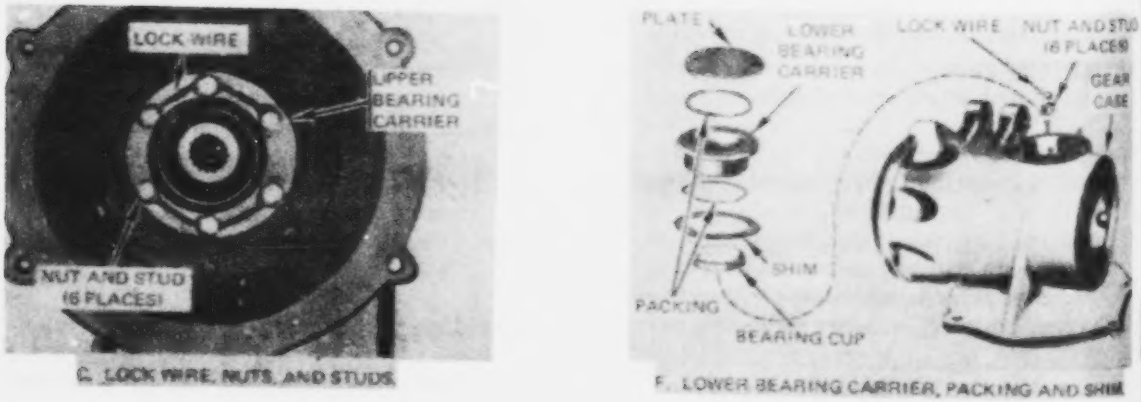
A. LOCK WIRE, CAP SCREWS, INSPECTION PLATE AND PACKING.

D. UPPER BEARING CARRIER


LOCK WIRE
GEARCASE PLATE
UT AND STUD (6 PLACES)
GENERATOR DRIVE GEARCASE
UPPER BEARING CARRIER
BEARING CUP
SEAL
SHIM
PACKING

B. LOCK WIRE, NUTS, AND GEARCASE PLATE.

E. PACKING, SHIMS, AND SEAL.

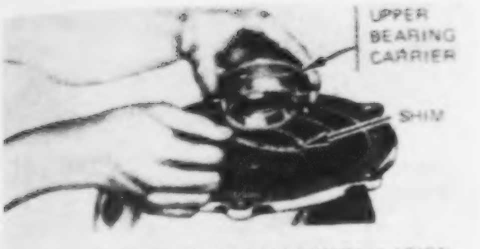

LOCK WIRE
UPPER BEARING CARRIER
NUT AND STUD (6 PLACES)
PLATE
LOWER BEARING CARRIER
LOCK WIRE
NUT AND STUD (6 PLACES)
GEAR CASE
SHIM
PACKING
BEARING CUP

C. LOCK WIRE, NUTS, AND STUDS.

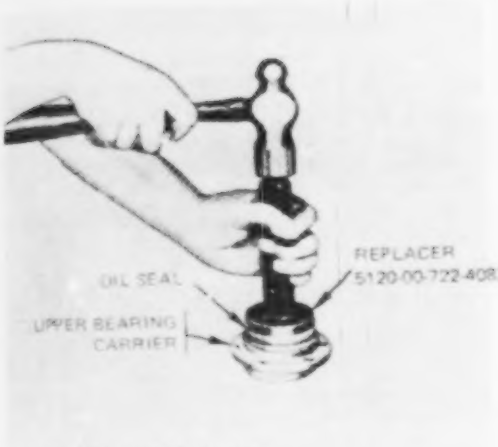
F. LOWER BEARING CARRIER, PACKING AND SHIM

AT 46338

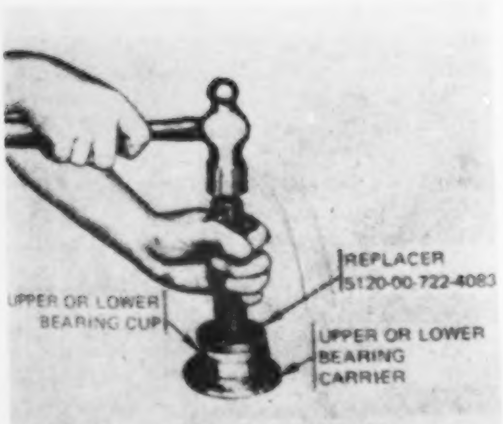
Figure 6-10. Generator drive subassembly disassembly or assembly (sheet 1 of 4).


UPPER BEARING CARRIER
SHIM

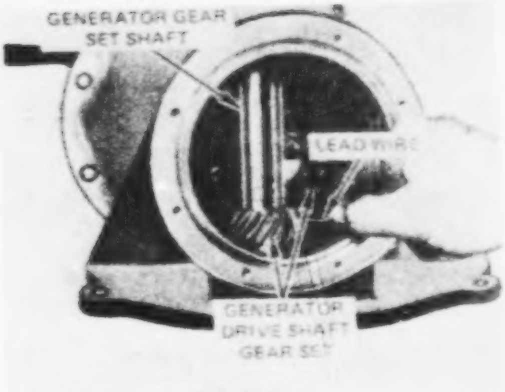
G. BEARING CARRIER AND SHIM INSTALLATION


REPLACER 5120-00-722-4083
OIL SEAL
UPPER BEARING CARRIER

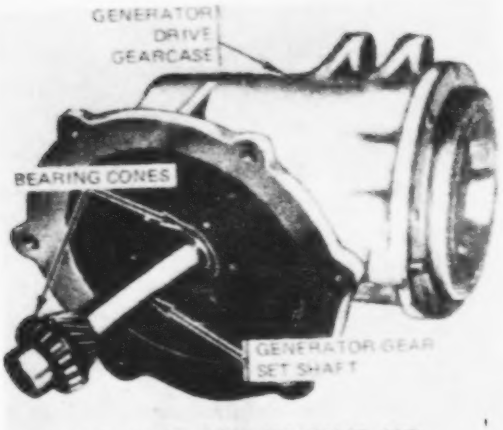
H. OIL SEAL INSTALLATION.


REPLACER 5120-00-722-4083
UPPER OR LOWER BEARING CUP
UPPER OR LOWER BEARING CARRIER

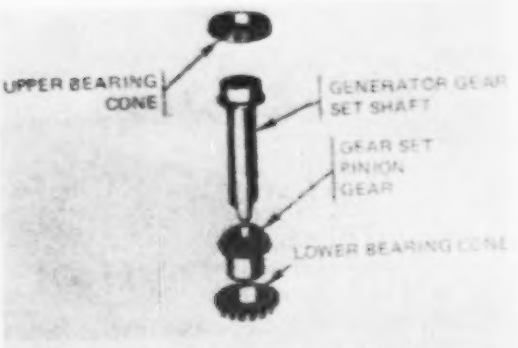
I. GENERATOR GEAR SET PINION GEAR AND UPPER AND LOWER BEARING CUP INSTALLATION.


GENERATOR GEAR SET SHAFT
LEAD WIRE
GENERATOR DRIVE SHAFT GEAR SET

J. GENERATOR DRIVESHAFT GEARSET ADJUSTMENT


GENERATOR DRIVE GEARCASE
BEARING CONES
GENERATOR GEAR SET SHAFT

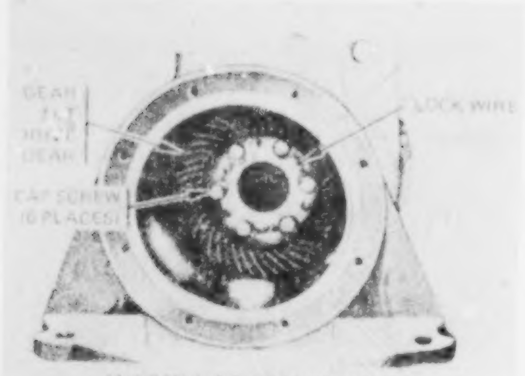
K. GENERATOR GEAR SET, SHAFT, AND BEARING CONES.


UPPER BEARING CONE
GENERATOR GEAR SET SHAFT
GEAR SET PINION GEAR
LOWER BEARING CONE

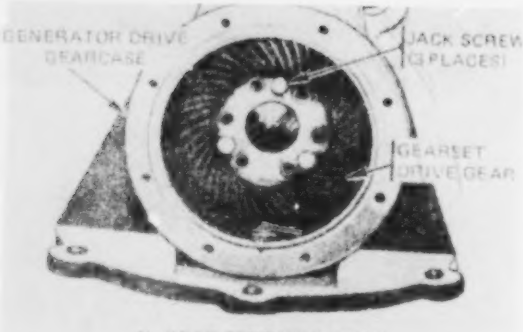
L. UPPER AND LOWER BEARING CONES.

TA 030353

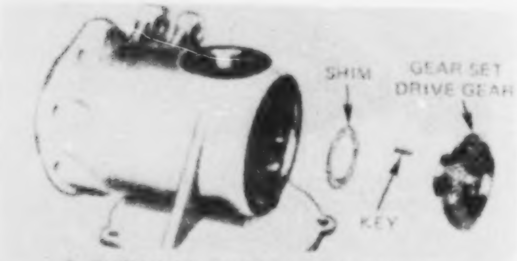
Figure 6-10. Generator drive subassembly disassembly or assembly (sheet 2 of 4).


GEAR SET SINGLE GEAR
CAP SCREW (6 PLACES)
LOCK WIRE

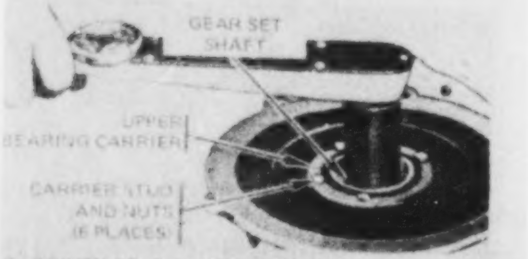
M. LOCK WIRE AND CAP SCREWS


GENERATOR DRIVE GEARCASE
JACK SCREW (3 PLACES)
GEARSET DRIVE GEAR

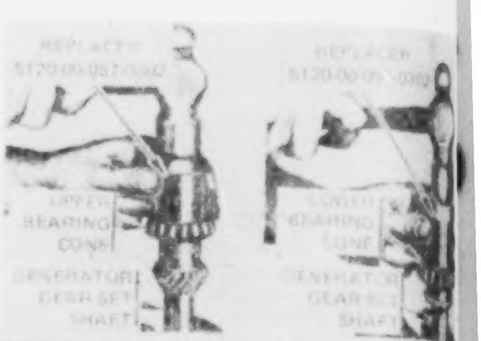
N. GEAR SET DRIVE GEAR


SHIM
GEAR SET DRIVE GEAR
KEY

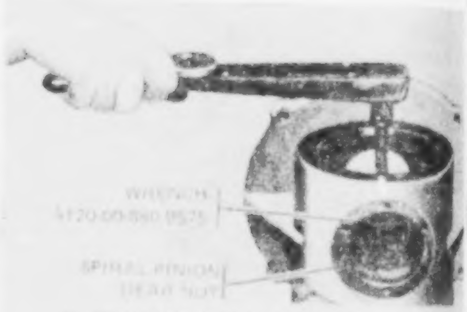
O. OUTPUT BEVEL GEAR, SHIM, AND KEY


GEAR SET SHAFT
UPPER BEARING CARRIER
CARRIER STUD AND NUTS (6 PLACES)

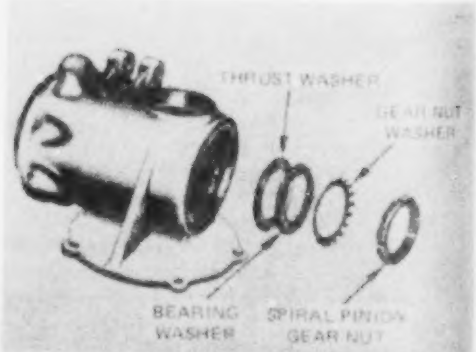
P. DRIVEN GEAR SHAFT, BEARING CARRIER, AND STUDS AND NUT INSTALLATION


REPLACER 5120-00-057-0902
UPPER BEARING CONE
GENERATOR GEAR SET SHAFT
REPLACER 5120-00-057-0902
LOWER BEARING CONE
GENERATOR GEAR SET SHAFT

Q. UPPER AND LOWER BEARING CONES INSTALLATION


WRENCH 5120-00-860-9575
SPIRAL PINION GEAR NUT

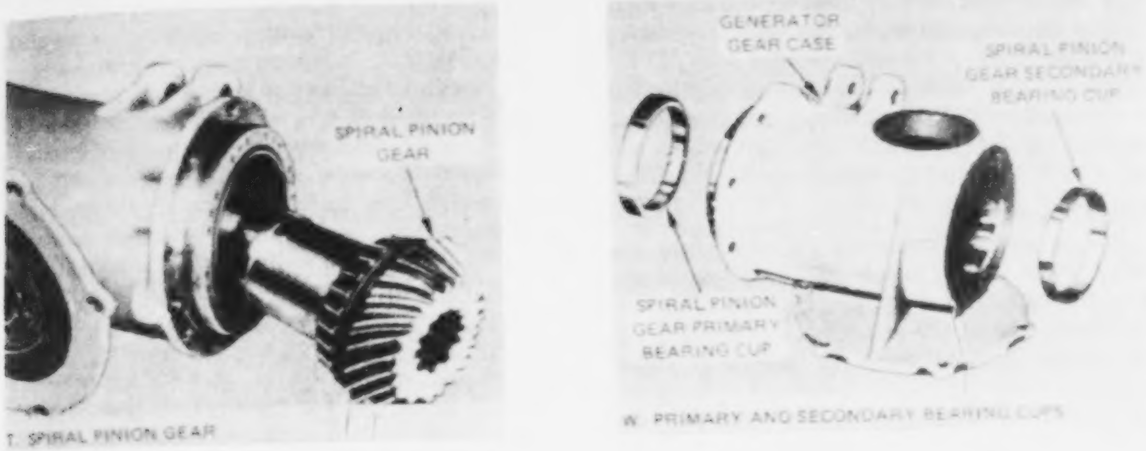
R. TORQUING SPIRAL PINION GEAR NUT


THRUST WASHER
GEAR NUT WASHER
BEARING WASHER
SPIRAL PINION GEAR NUT

S. NUT, RETAINING WASHER, AND THRUST WASHER

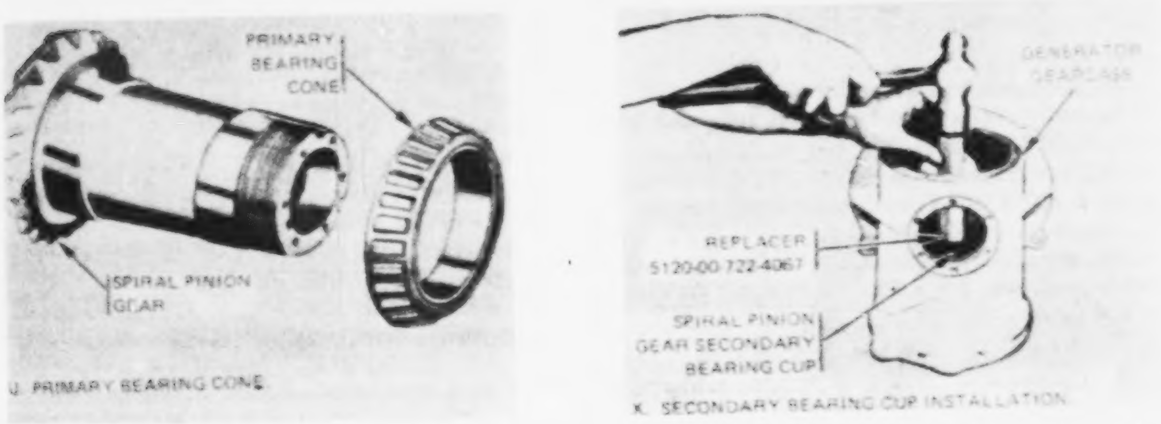
TA 030304

Figure 6-10. Generator drive subassembly disassembly or assembly (sheet 3 of 4).


SPIRAL PINION
GEAR
GENERATOR
GEAR CASE
SPIRAL PINION
GEAR SECONDARY
BEARING CUP
SPIRAL PINION
GEAR PRIMARY
BEARING CUP

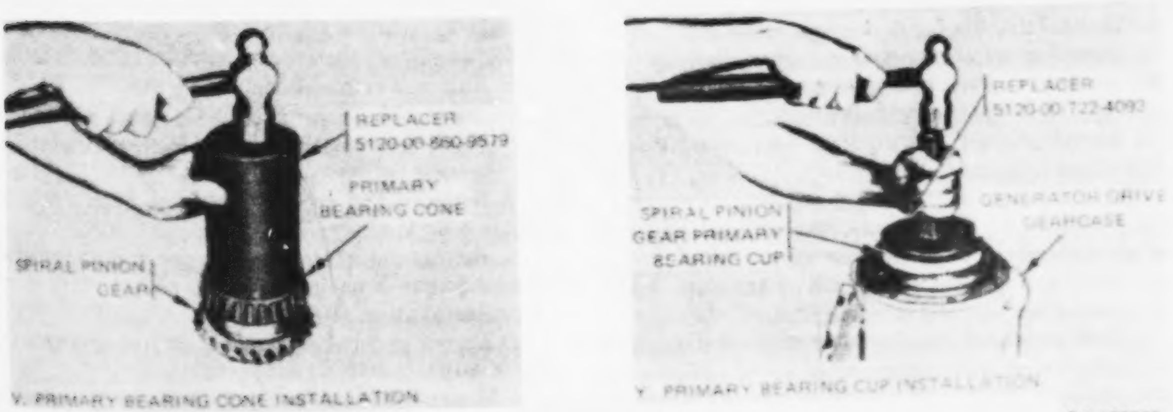
T. SPIRAL PINION GEAR

W. PRIMARY AND SECONDARY BEARING CUPS


PRIMARY
BEARING
CONE
SPIRAL PINION
GEAR
GENERATOR
GEARCASE
REPLACER
5120-00-722-4067
SPIRAL PINION
GEAR SECONDARY
BEARING CUP

U. PRIMARY BEARING CONE

X. SECONDARY BEARING CUP INSTALLATION


REPLACER
5120-00-860-9579
PRIMARY
BEARING CONE
SPIRAL PINION
GEAR
REPLACER
5120-00-722-4093
SPIRAL PINION
GEAR PRIMARY
BEARING CUP
GENERATOR DRIVE
GEARCASE

V. PRIMARY BEARING CONE INSTALLATION

Y. PRIMARY BEARING CUP INSTALLATION

TA 030356

Figure 6-10. Generator drive subassembly disassembly or assembly (sheet 4 of 4).

6-31. Cleaning

a. Clean bearings in accordance with TM 9-214.

b. Remove sealing compound with alcohol.

c. Clean all parts with dry-cleaning solvent (SD-2).

d. Dry all parts, except bearings, with low pressure compressed air.

e. Remove rust and corrosion from non-bearing surfaces with solvent (SD-2), wire brush and crocus cloth.

f. Coat unpainted parts and mating surfaces with engine oil (OE/HDO) to prevent corrosion or rusting.

6-32. Inspection

a. Inspect all parts for physical damage, breaks, pits, cracks, sharp ragged edges, rusted or deteriorated areas, scoring and for chipped or cracked paint.

b. Inspect bearings as prescribed in TM 9-214.

c. Inspect threaded areas for damage or crossed threads.

d. Inspect splines and gear teeth for wear, chipped or cracked areas and bearing surfaces for wear and scratches.

e. Inspect and measure parts for wear in accordance with repair standards, table 6-4 and figure 6-15.

6-33. Repair

a. Replace seals and preformed packings.

b. Remove nicks on gearcase with file and polish with crocus cloth.

c. Replace bearings that do not meet acceptance standards of TM 9-214.

d. Repair damaged threaded areas with tap or die.

e. Replace defective non-repairable parts and parts worn beyond wear limits specified in repair standards 6-4 and figure 6-15.

f. Replace defective gears as matched sets.

6-34. Generator Drive Subassembly Assembly

a. Install spiral pinion gear primary bearing cup into generator drive gearcase using replacer (NSN 5120-00-722-4093) (Y, fig. 6-10).

b. Install spiral pinion gear secondary bearing cup into generator drive gearcase using replacer (NSN 5120-00-722-4067) (X, fig. 6-10).

c. Install primary bearing cone onto spiral pinion gear using replacer (NSN 5120-00-860-9579) (V, fig. 6-10).

d. Coat primary bearing cone with oil (OE/HDO) and install cone on spiral pinion gear. Install spiral pinion gear and bearing cone into generator gearcase. Make sure cone seats properly into cup (T, fig. 6-10).

e. Coat secondary bearing cone with oil (OE/HDO) and install cone over inside end of spiral pinion gear into gearcase. Make sure cone is completely seated in gearcase.

f. Hold spiral pinion gear firmly into gearcase and install thrust washer, bearing washer, gear nut washer and spiral pinion gear nut in inner end of spiral pinion gear (S, fig. 6-10).

g. Tighten spiral pinion gear nut using wrench (NSN 5120-00-860-9575) until a torque of 15-25 lb in. is required to turn spiral pinion gear within its bearings (R, fig. 6-10). After adjustment, bend tangs of gear nut washer into grooves of gear nut.

h. Measure and record dimensions A, B and C as shown on figure 6-3.

CAUTION

> If gearset pinion gear or drive gear need replacement, replace both gears as a matched set.

i. Press gearset pinion gear onto generator gear set shaft until firmly seated against shaft. Do not disassemble after initial assembly (L, fig. 6-10).

j. Install upper and lower bearing cones on generator gear set shaft using remover and replacer (NSN 5120-00-057-0302) (Q, fig. 6-10).

k. Install upper and lower generator gearset shaft bearing cups into upper and lower bearing carriers using replacer (NSN 5120-00-722-4083) (I, fig. 6-10).

l. Install generator gearset shaft lower bearing carrier onto gearcase using two shims between carrier and gearcase. Secure carrier temporarily with three evenly spaced nuts tightened to make sure carrier seats completely, (F, fig. 6-10).

m. Install generator gearset shaft into gearcase and lower bearing carrier. Make sure lower bearing cone seats properly into cup (K, fig. 6-10).

n. Install upper bearing carrier using two shims between carrier and gearcase. Make sure inner bearing cup seats properly over cone (G, fig. 6-10).

o. Secure upper bearing carrier temporarily with three evenly spaced nuts tightened to make sure carrier seats completely.

p. Check torque required to rotate generator gear set shaft in bearings. Torque required should be 5 to 15 lb in. Remove laminations from shims from either bearing carrier to achieve required torque. When torque is achieved, remove one bearing carrier and add one 0.00 inch shim and reinstall bearing carrier.

NOTE

> Jack screws may be required to remove upper bearing carrier.

q. Measure and record dimension E as shown on figure 6-3.

r. Remove upper bearing carrier and shims after proper torque is achieved (para *p* above). Mark shims for reinstallation.

s. Remove generator gearset shaft from gearcase (K, fig. 6-10).

t. Measure dimensions D and F (fig. 6-3) and using dimensions A and E recorded in steps *h.* and *q.* above, determine thickness of shim G by calculation with formula $G = A - (E + \frac{D}{2} + F)$ (fig. 6-3).

u. Install key into spiral pinion gear (O, fig. 6-10).

v. Install shim with thickness determined in step *t* above on end of spiral pinion gear (O, fig. 6-10).

w. Install gearset drive gear over shim and into end of spiral pinion gear and secure with six cap screws. Tighten and secure screws with lock wire (M, fig. 6-10).

x. Reinstall generator gearset shaft, shim and upper bearing carrier removed in paragraphs *r* and *s* above. Temporarily secure carrier with three nuts tightened to make sure carrier seats completely.

y. Insert lead wire between gearset pinion gear and drive gear teeth at large end of teeth to check gear backlash. Rotate generator gearset shaft through one gear tooth and lead wire. Reverse rotation and remove lead wire (J, fig. 6-10).

z. Measure thickness of flattened portion of lead wire with micrometer to determine backlash. Backlash must be 0.002 to 0.003 inch.

aa. If backlash of gearset drive and pinion gear is not correct, transfer shims from one generator gearset shaft bearing carrier to other bearing carrier (G, fig. 6-10).

NOTE

To increase backlash, transfer shims from lower to upper bearing carrier. To decrease backlash, transfer shims from upper to lower bearing carrier. Each lamination of shim is 0.002 inch thick. An approximate 0.001 inch change in backlash requires transfer of two shim laminations.

ab. Apply suitable marking compound to four or five teeth of generator gearset drive and pinion gears and rotate generator gear set shaft. Examine wear pattern on gear teeth. Wear pattern should be approximately one half length and depth of tooth and centered on tooth face. Refer to figure 6-4 for correct wear pattern. Correct backlash in accordance with paragraph *aa* above.

ac. Remove three nuts securing upper bearing carrier and remove carrier. Install oil seal, with open lip facing in, into carrier using replacer (NSN 5120-00-722-4083) (I, fig. 6-10).

ad. Install preformed packing onto upper bearing carrier (E, fig. 6-10).

ae. Make sure shim is properly in place and install upper bearing carrier in gearcase. Secure carrier with six nuts. Tighten and secure nuts with lock wire (C, fig. 6-10).

af. Remove three nuts securing lower bearing carrier and remove carrier.

ag. Install lower preformed packing into lower bearing carrier (F, fig. 6-10).

ah. Make sure shim is properly in place and install lower bearing carrier in gearcase. Install preformed packing in outer face of lower bearing carrier (F, fig. 6-10).

ai. Install closure plate over lower bearing carrier and secure plate and carrier with six nuts. Tighten and secure nuts with lock wire (B, fig. 6-10).

Section VIII. INPUT DRIVE SUBASSEMBLY REPAIR

6-35. General

This section contains instructions for disassembly, cleaning, inspection, repair and assembly of the input drive subassembly.

6-36. Input Drive Subassembly Disassembly

a. Remove lock wire and six screws securing input shaft bearing carrier to input drive housing (A, fig. 6-11).

b. Use three removed screws as jack screws and loosen input shaft bearing carrier from housing (B, fig. 6-11).

c. Pull bearing carrier and input shaft out and remove from housing (C, fig. 6-11).

d. Remove preformed packing and inspection plug from housing. Remove preformed packing from plug (D, fig. 6-11).

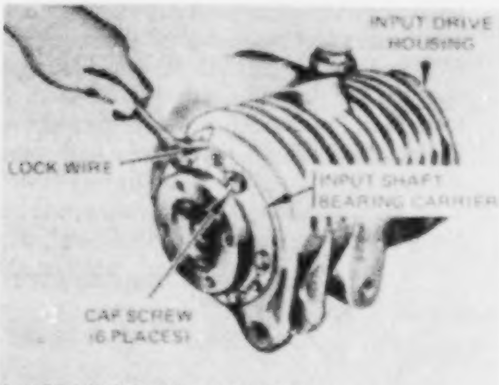
e. Remove retaining ring from input shaft (E, fig. 6-11).

f. Using suitable press, press input shaft out of bearing in bearing carrier (F, fig. 6-11).

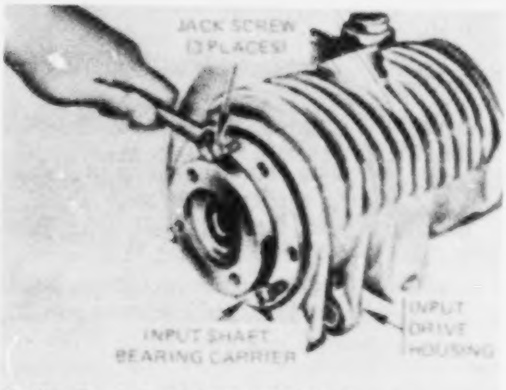
g. Remove shaft bearing retaining ring from bearing carrier (G, fig. 6-11).

h. Pry out and discard two seals from outer end of bearing carrier.

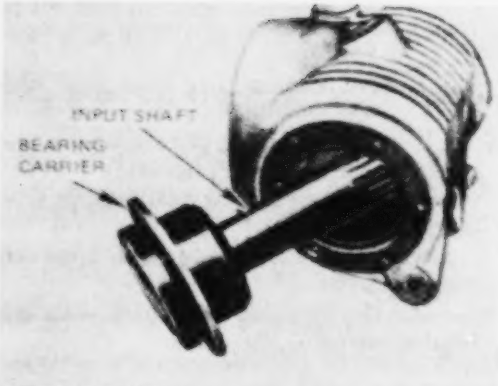
i. Use bearing puller and remove shaft bearing and bearing carrier (G, fig. 6-11)


INPUT DRIVE HOUSING
LOCK WIRE
INPUT SHAFT BEARING CARRIER
CAP SCREW (6 PLACES)

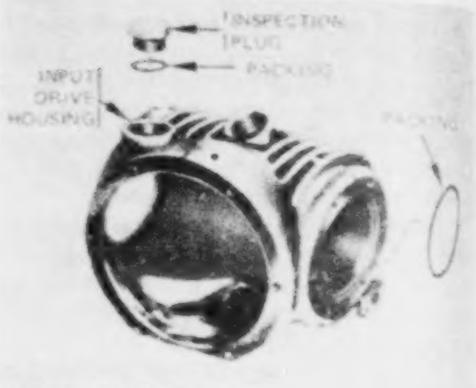
A. LOCK WIRE AND CAP SCREWS


JACK SCREW (3 PLACES)
INPUT SHAFT BEARING CARRIER
INPUT DRIVE HOUSING

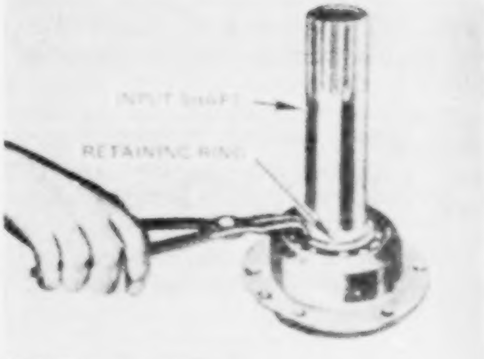
B. INPUT SHAFT BEARING CARRIER


INPUT SHAFT
BEARING CARRIER

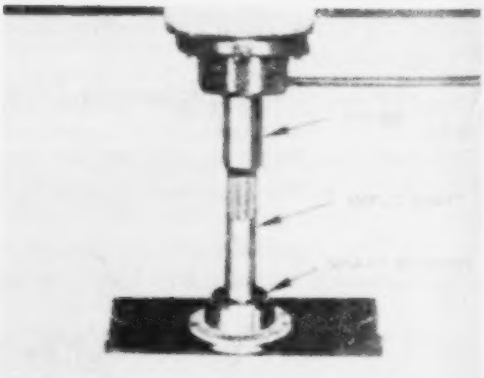
C. INPUT SHAFT


INSPECTION PLUG
PACKING
INPUT DRIVE HOUSING
PACKING

D. PLUG AND PACKING

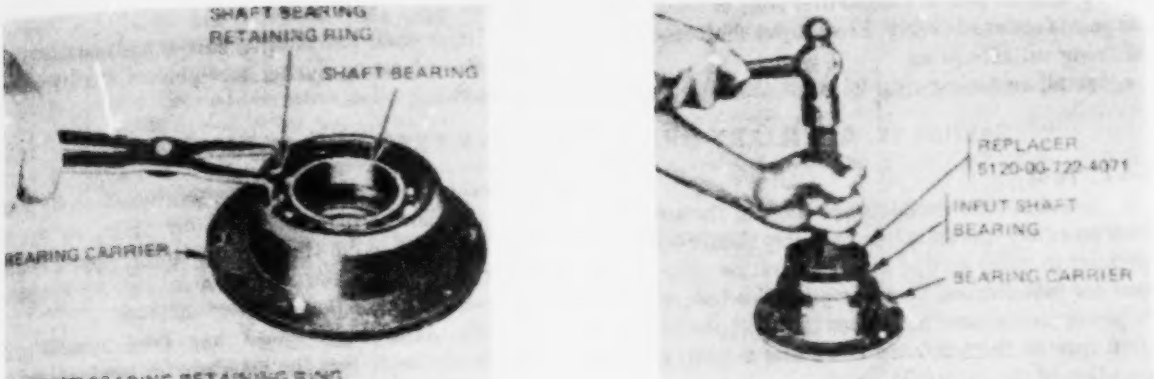

INPUT SHAFT
RETAINING RING

E. RETAINING RING


INPUT SHAFT
SHAFT BEARING

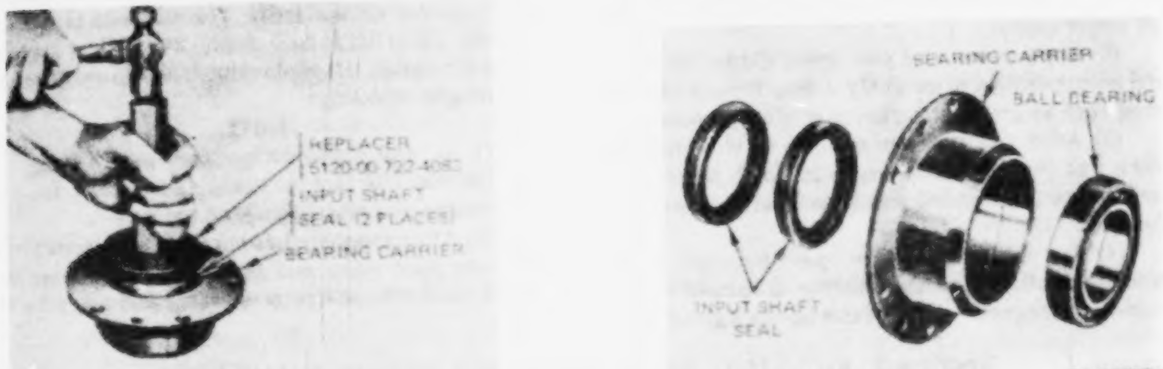
F. AUXILIARY DRIVE INPUT SHAFT, BEARING AND CARRIER

Figure 6-11. Input drive subassembly disassembly or assembly (sheet 1 of 2).


SHAFT BEARING
RETAINING RING
SHAFT BEARING
BEARING CARRIER
REPLACER
5120-00-722-4071
INPUT SHAFT
BEARING
BEARING CARRIER

G. SHAFT BEARING RETAINING RING.

I. INPUT SHAFT BALL BEARING INSTALLATION.


REPLACER
5120-00-722-4083
INPUT SHAFT
SEAL (2 PLACES)
BEARING CARRIER
BEARING CARRIER
BALL BEARING
INPUT SHAFT
SEAL

H. INPUT SHAFT SEALS INSTALLATION.

J. BALL BEARING AND SEALS.

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Figure 6-11. Input drive subassembly disassembly or assembly (sheet 2 of 2).

6-37. Cleaning

a. Clean bearings in accordance with TM 9-214.

b. Clean all parts with dry-cleaning solvent (SD-2).

c. Remove rust or corrosion from non-bearing surfaces with solvent (SD-2), wire brush and crocus cloth.

CAUTION

Do not spin bearing with compressed air.

d. Dry all parts with low pressure compressed air.

e. Coat unpainted parts and mating surfaces with engine oil (OE/HDO) to prevent corrosion or rusting.

6-38. Inspection

a. Inspect parts for physical damage, breaks, pits, cracks, sharp ragged edges, deformation, rusted or deteriorated areas, scoring and for chipped or cracked paint.

b. Inspect bearing as prescribed in TM 9-214.

c. Inspect threaded areas for damaged or crossed threads.

d. Inspect splines for wear, chipped or cracked areas and bearing surfaces for wear and scratches.

e. Inspect and measure parts for wear in accordance with repair standards, table 6-5 and figure 6-16.

6-39. Repair

a. Weld small cracks in housing.

b. Replace preformed packing and seals.

c. Replace bearing that does not meet acceptance standards of TM 9-214.

d. Repair damaged threaded areas with tap or die.

e. Replace parts worn beyond wear limits specified in repair standards, table 6-5 and figure 6-16.

6-40. Input Drive Subassembly Assembly

a. Lightly lubricate bearing outer surface with grease (GAA) and install input shaft bearing into bearing carrier using replacer (NSN 5120-00-722-4071) (I, fig. 6-11).

b. Install bearing retaining ring in bearing carrier and secure bearing (G, fig. 6-11).

CAUTION

An improperly installed seal will leak during operation.

c. Install two seals into bearing carrier using replacer (NSN 5120-00-722-4083). Make sure lip of inner seal is toward bearing and lip of outer seal is facing toward outside of carrier (H, fig. 6-11).

CAUTION

A nicked, scratched or cut seal lip will leak during operation.

d. Install input shaft through bearing carrier. Make sure lip of outer seal is worked over edge of input shaft and points outward evenly. Press input shaft into bearing using suitable press.

e. Install retaining ring in input shaft groove and secure input shaft (E, fig. 6-11).

f. Input shaft and bearing carrier are installed in input drive housing during assembly of auxiliary drive (para 6-5*d*).

Section IX. AUXILIARY DRIVE ASSEMBLY TEST AND ADJUSTMENT

6-41. Test

a. General. After complete assembly of the auxiliary drive assembly, the complete assembly should be bench operated to make sure of proper operation prior to reissue for installation. To accomplish this test, a suitable power source must be devised that will provide up to 2,000 rpm of the auxiliary drive and a load, no-load operation of the magnetic clutch.

b. Procedure.

(1) Attach the auxiliary drive assembly to a suitable power source.

(2) Apply power at a slow speed (50 to 100 RPM) and note operation of assembly. Listen for any unusual noise such as grinding, scraping or clicking sounds.

(3) After two or three minutes of slow rotation touch test gearcases and magnetic clutch housing for surface heat. No housing should be other than warm to the touch.

(4) Run assembly at slow speed for eight to ten minutes to allow gear and bearing alinement and to make sure magnetic clutch plates have all small burrs smoothed down. Periodically check housings for heat.

(5) Slowly increase assembly speed in approximately 500 RPM increments until approximately 2,000 RPM is achieved. Watch and listen for vibrations or unusual noises during speed increase.

(6) After high speed has been reached, immediately touch test the housings for temperature. At no time should any housing be uncomfortably warm.

(7) After assembly has operated at high speed for 3 to 5 minutes satisfactorily, reduce speed to approximately 1,200 RPM and apply 24V DC to energize magnetic clutch. Magnetic clutch should energize and de-energize smoothly.

NOTE

If at any time during test any housing becomes too hot to touch, shut down immediately and troubleshoot the item.

(8) After assembly has operated satisfactorily for all tests, shut down and remove assembly from test stand. Assembly is now serviceable and ready for reissue.

Section X. AUXILIARY DRIVE ASSEMBLY REPAIR STANDARDS

6-42. General

Repair standards for the auxiliary drive assembly are listed in tables 6-1 through 6-5 and figures 6-12 through 6-16. The reference letters on the illustration are shown in the second column of the table. Each item in the table indicates the point of measurement or inspection, part name, size and fit of new part, wear limits, and code symbols to coordinate information. Wear limits indicate that point to which a part or parts may be worn before replacement in order to obtain maximum service with minimum replacement. The suffix letter L indicates a loose or clearance fit between two parts. The suffix letter T indicates a tight or interference fit between two parts. The asterisk (*) indicates that tolerances on an individual part must be the same as on a new part. The double asterisk (**) indicates that the part may be used by selective fitting, provided that the mating part permits the fit required between the two parts.

Table 6-1. Auxiliary Drive Magnetic Drive Clutch and Clutch Drive Shaft Subassemblies Repair Standards ("A" Vehicles)

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
6-12	A	OD of output flange outer bearing	2.4409 to 2.4404	*
6-12	B	ID of output flange outer bearing	1.1807 to 1.1811	*
6-12	C	Output flange external spur gear measurement over 0.24686 pins	4.9020 to 4.8950	4.8810
6-12	D	ID of output flange rear outer bearing bore	2.4401 to 2.4413	2.4425
6-12	A-D	Fit of rear outer bearing OD to ID of output flange outer bearing bore	0.0008T to 0.0009L	0.0021L
6-12	E	ID of output flange inner bearing bore	2.4401 to 2.4413	2.4425
6-12	F	OD of output flange inner bearing	2.4409 to 2.4404	*
6-12	E-F	Fit of output flange inner bearing bore ID to OD of inner bearing	0.0008T to 0.0009L	0.0021L
6-12	G	ID of output flange inner bearing	1.3775 to 1.3780	*
6-12	H	ID of clutch shaft sleeve at end opposite spline	1.3795 to 1.3800	1.3815
6-12	J	Clutch shaft sleeve internal spline measurement between 0.216 pins	1.5521 to 1.5548	1.5581
6-12	K	OD of clutch shaft rear outer bearing carrier	1.1816 to 1.1812	1.1808
6-12	B-K	Fit of rear outer bearing ID to OD of clutch shaft rear outside bearing carrier	0.0009T to 0.0001T	0.0003L
6-12	L	OD of clutch shaft rear inner bearing surface	1.3785 to 1.3781	1.3777
6-12	H-L	Fit of sleeve at end opposite spline ID to OD of clutch shaft rear inner bearing carrier	0.0005T to 0.0014L	0.0038L

Table 6-1. Auxiliary Drive Magnetic Drive Clutch and Clutch Drive Shaft Subassemblies Repair Standards ("A" Vehicles) — Continued

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
6-12	M	Clutch shaft external spline measurement over 0.240 pins (magnetic clutch end of clutch shaft)	2.2294 to 2.2275	2.2203
6-12	N	OD of clutch shaft rear support bearing surface	2.0000 to 1.9992	1.9982
6-12	P	Clutch shaft external spline measurement over 0.240 pins (gear housing end of drive shaft)	2.2294 to 2.2275	2.2225
6-12	R	OD of clutch shaft needle bearing	2.5625 to 2.5619	*
6-12	Q	ID of clutch shaft needle bearing	2.0000 to 1.9995	*
6-12	N-Q	Fit of clutch shaft rear support bearing surface OD to ID of needle bearing	0.0000T to 0.0008L	0.0018L
6-12	S	ID of drive shaft housing rear support bearing bore	2.5625 to 2.5637	2.5644
6-12	R-S	Fit of clutch shaft needle bearing OD to ID of drive shaft housing bearing bore	0.0000 to 0.0018L	0.0025L

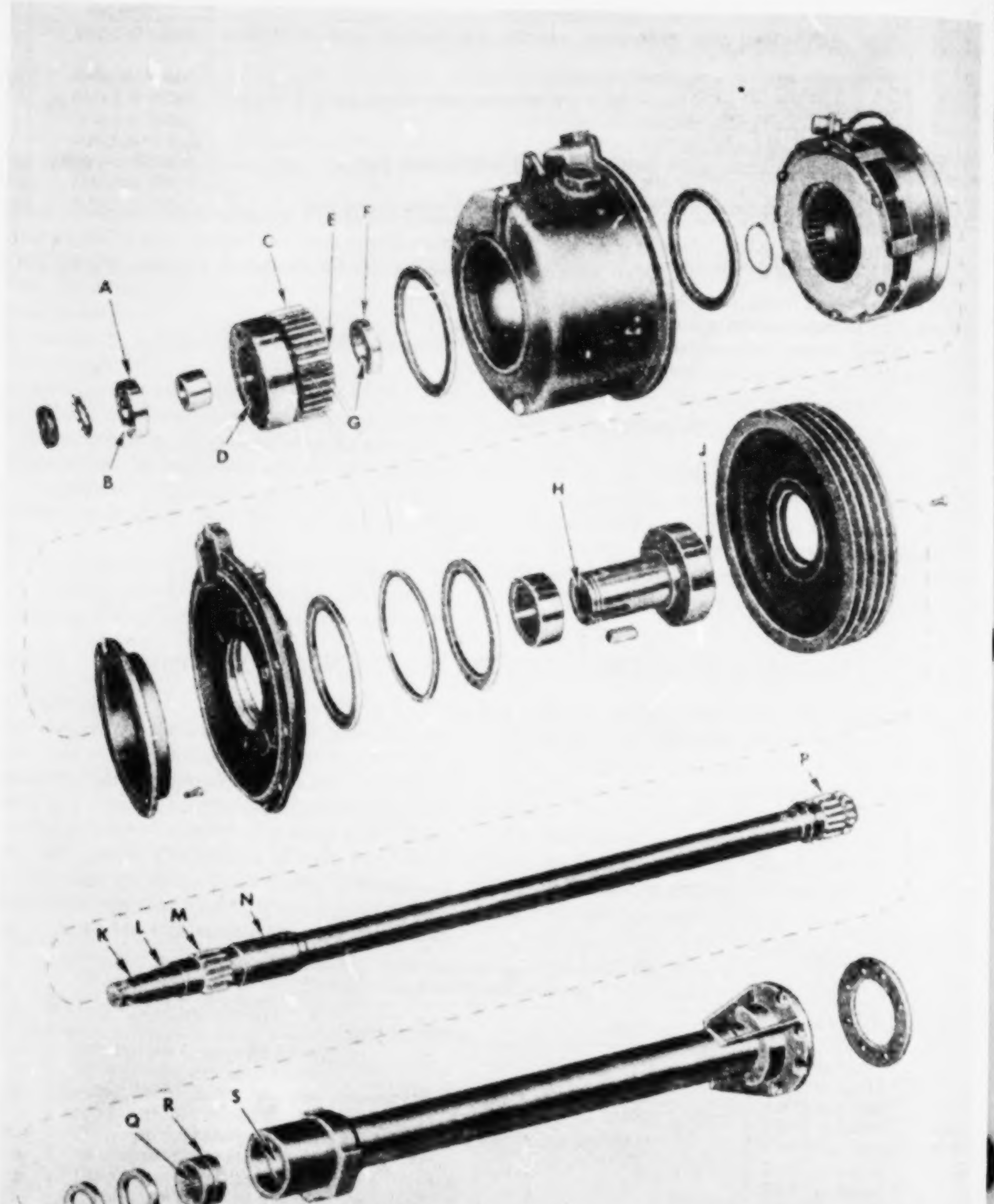
A
B
C
D
E
F
G
H
J
K
L
M
N
P
Q
R
S
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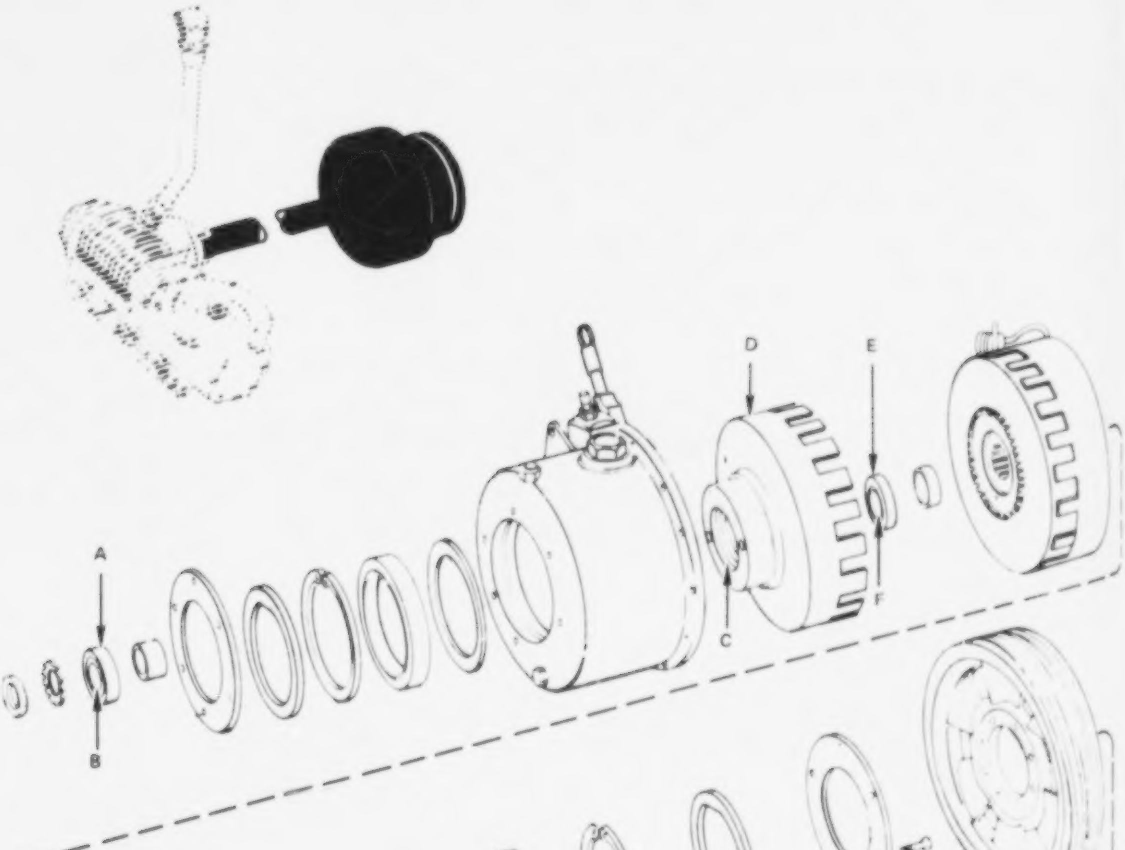
Figure 6-12. Auxiliary drive magnetic drive clutch and clutch drive shaft subassemblies measurement and inspection points ("A" vehicle

Table 6-2. Auxiliary Drive Magnetic Drive Clutch and Clutch Drive Shaft Subassemblies Repair Standards ("B" Vehicles)

Fig no.	Ref letter	Point of measurement	Size and fit of new parts	Wear limits
6-13	A	OD of output flange outer bearing	2.4409 to 2.4404	•
6-13	B	ID of output flange outer bearing	1.1807 to 1.1811	•
6-13	C	ID of output flange rear outer bearing bore	2.4401 to 2.4413	2.4425
6-13	A-C	Fit of rear outer bearing OD to ID of output flange outer bearing bore	0.0008T to 0.0009L	0.0021L
6-13	D	ID of output flange inner bearing bore	2.4401 to 2.4413	2.4425
6-13	E	OD of output flange inner bearing	2.4409 to 2.4404	•
6-13	D-E	Fit of output flange inner bearing bore ID to OD of inner bearing	0.0008T to 0.0009L	0.0021L
6-13	F	ID of output flange inner bearing	1.3775 to 1.3780	•
6-13	G	OD of clutch shaft rear outer bearing carrier	1.1816 to 1.1812	1.1808
6-13	B-G	Fit of rear outer bearing ID to OD of clutch shaft rear outside bearing carrier	0.0009T to 0.0001T	0.0003L
6-13	H	OD of clutch shaft rear inner bearing surface	1.3785 to 1.3781	1.3777
6-13	J	Clutch shaft external spline measurement over 0.120 pins (magnetic clutch end of clutch shaft)	1.7427 to 1.7407	1.7357
6-13	K	OD of clutch shaft rear support bearing surface	1.6258 to 1.6254	1.6244
6-13	L	Clutch shaft external spline measurement over 0.240 pins (gear housing end of drive shaft)	2.2294 to 2.2275	2.2225
6-13	N	OD of clutch shaft needle bearing	2.5625 to 2.5619	•
6-13	M	ID of clutch shaft needle bearing	2.0000 to 1.9995	•
6-13	P	ID of drive shaft housing rear support bearing bore	2.5625 to 2.5637	2.5644
6-13	N-P	Fit of clutch shaft needle bearing OD to ID of drive shaft housing bearing bore	0.0000 to 0.0018L	0.0025L
6-13	Q	ID of clutch shaft bearing race	1.6245 to 1.6250	•
6-13	R	OD of clutch shaft bearing race	1.9982 to 1.9989	•


D
E
A
F
C
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M
P
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L
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H
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R

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Figure 6-13. Auxiliary drive magnetic drive clutch and clutch drive shaft subassemblies measurement and inspection points ("B" vehicle

Table 6-3. Auxiliary Drive Output Gear Subassembly Repair Standards

Fig no.	Ref letter	Point of measurement	Size and fit of new parts	Wear limits
6-14	A	Spiral drive gear internal spline measurement between 0.2160 diameter pins	1.5521 to 1.5548	1.5581
6-14	B	OD of spiral drive gear primary bearing surface	3.2828 to 3.2818	3.2798
6-14	C	OD of spiral drive gear secondary bearing surface	2.9998 to 2.9988	2.9970
6-14	D	ID of primary bearing cone	3.2813 to 3.2818	3.2823
6-14	B-D	Fit of primary bearing cone ID to OD of primary bearing surface	0.0015T to 0.0000T	0.0025L
6-14	E	OD of primary bearing cup	4.9385 to 4.9375	*
6-14	F	ID of output drive gear housing primary bearing bore	4.9365 to 4.9375	4.9395
6-14	E-F	Fit of output drive gear housing primary bearing housing bore ID to OD of primary bearing cup	0.0020T to 0.0000T	0.0020L
6-14	G	ID of output drive gear housing secondary bearing bore	4.7802 to 4.7812	4.7822
6-14	H	OD of secondary bearing cup	4.7822 to 4.7812	4.7805
6-14	G-H	Fit of output drive gear housing bearing bore ID to OD of secondary bearing cup	0.0020T to 0.0000T	0.0017L
6-14	J	ID of secondary bearing cone	3.000 to 3.0010	*
6-14	C-J	Fit of spiral drive gear secondary bearing surface OD to ID of secondary bearing cone	0.0002L to 0.0022L	0.0040L

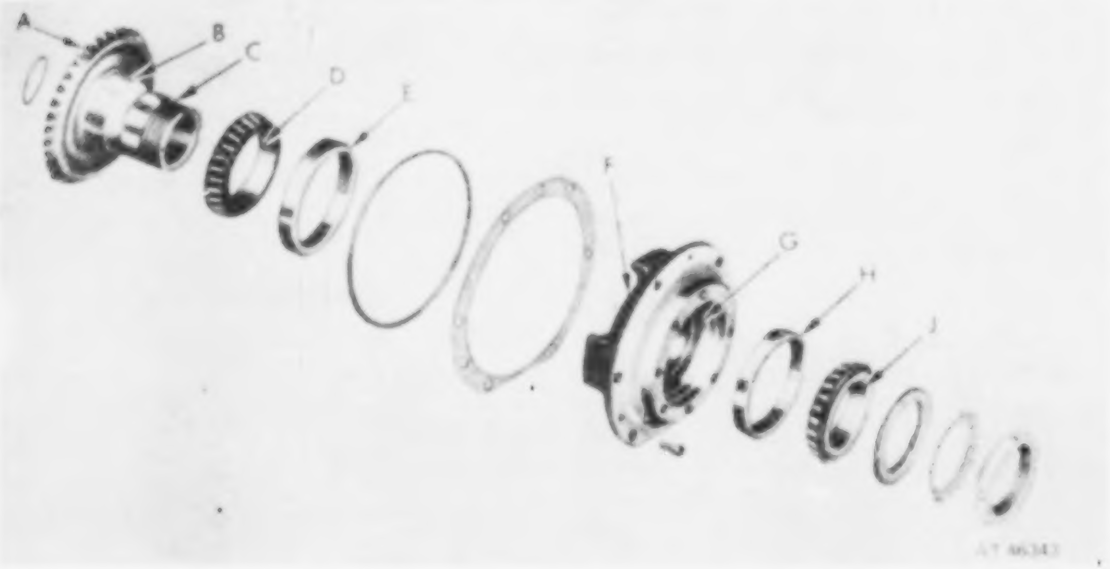

Figure 6-14. Auxiliary drive output gear subassembly measurement and inspection points.

Table 6-4. Auxiliary Drive Generator Drive Subassembly Repair Standards

Fig no	Ref letter	Point of measurement	Size and fit of new parts	Wear limits
6-15	A	Spiral bevel gear sets are manufactured as matched pairs and are suitably serial numbered as such. Actual mounting distance, match number, and backlash are etched on each gear. Members of one matched pair are not interchangeable with those of other matched pairs and will be replaced as a set. Backlash requirements are subject to wear limits noted.		
6-15	B	OD of spiral pinion gear primary bearing surface	3.2828 to 3.2818	3.2798
6-15	C	OD of spiral pinion gear secondary bearing surface	2.9998 to 2.9988	2.9970
6-15	D	ID of spiral pinion gear primary bearing cone	3.2813 to 3.2818	3.2823
6-15	B-D	Fit of primary bearing cone ID to OD of bearing surface	0.0015T to 0.0000T	0.0025L
6-15	E	OD of spiral pinion gear primary bearing cup	4.9385 to 4.9375	*
6-15	F	ID of spiral pinion gear primary bearing bore in generator drive gearcase insert	4.9365 to 4.9375	4.9394
6-15	E-F	Fit of bearing bore ID to OD of primary bearing cup	0.0020T to 0.0000T	0.0020L
6-15	M	ID of spiral pinion gear secondary bearing bore in generator drive gearcase insert	4.7802 to 4.7812	4.7822
6-15	N	OD of spiral pinion gear secondary bearing cup	4.7822 to 4.7812	4.7805
6-15	M-N	Fit of secondary bearing cup OD to ID of gearcase insert	0.0020T to 0.0000T	0.0017L
6-15	P	ID of spiral pinion gear secondary bearing cone	3.0000 to 3.0010	*
6-15	C-P	Fit of secondary bearing cone ID to OD of spiral pinion gear bearing surface	0.0002L to 0.0022L	0.0040L

Table 6-4. Auxiliary Drive Generator Drive Subassembly Repair Standards — Continued

Fig. no.	Ref letter	Point of measurement	Size and fit of new parts	Wear limits
6-15	G	ID of upper and lower bearing carrier bore	2.8425 to 2.8435	*
6-15	H	OD of upper and lower carrier outer surface	3.2200 to 3.2180	*
6-15	J	OD of upper and lower bearing cup	2.8450 to 2.8440	*
6-15	G-J	Fit of upper and lower bearing carrier bore ID to OD of bearing cups	0.0025T to 0.0005T	*
6-15	K	ID of upper and lower bearing cone	1.5000 to 1.5005	*
6-15	L	ID of upper and lower bearing carrier seat bore in generator drive gearcase	3.2210 to 3.2230	3.2250
6-15	H-L	Fit of upper and lower bearing carrier OD to ID of bore in generator drive gearcase	0.0010L to 0.0050L	*
6-15	Q	OD of bearing surface on generator gear set shaft	1.5015 to 1.5010	1.5000
6-15	K-Q	Fit of lower bearing cone ID to OD of generator gear set shaft	0.0015T to 0.0005T	0.0005L
6-15	R	OD of generator gear set shaft pinion gear mounting surface	0.8765 to 0.8760	0.8755
6-15	S	ID of bore in pinion gear	0.8750 to 0.8755	*
6-15	R-S	Fit of gear set shaft pinion mounting surface OD to ID of pinion gear	0.0015T to 0.0005T	0.0005L
6-15	T	OD of upper bearing cone surface on pinion gear	1.5015 to 1.5010	1.5000
6-15	K-T	Fit of upper bearing cone ID to OD of pinion gear bearing surface	0.0015T to 0.0005T	0.0005L
6-15	U	Pinion gear internal spline measurement between 0.0864 diameter pins	0.6744 to 0.6785	0.6830

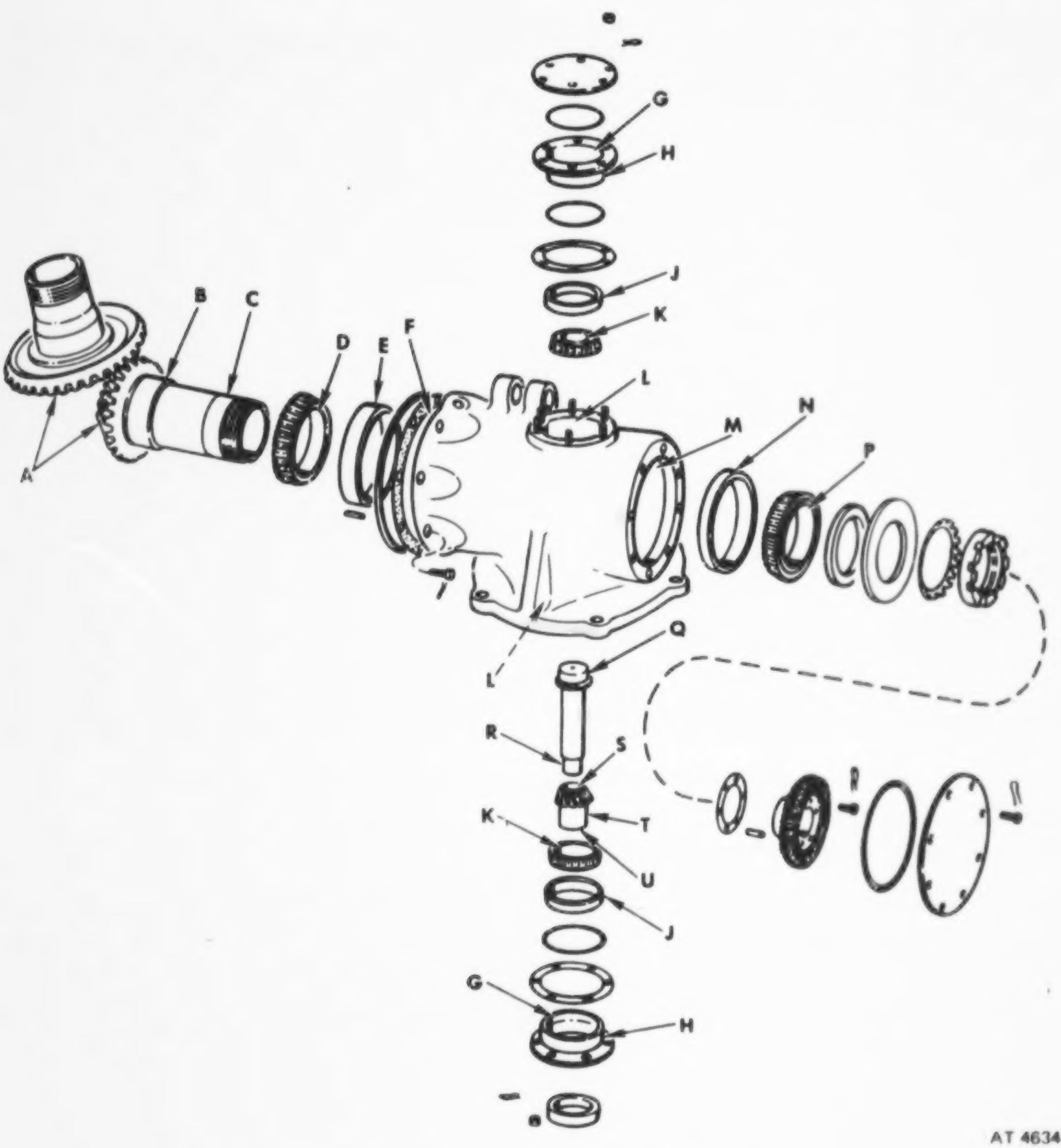

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Figure 6-15. Auxiliary drive generator drive subassembly measurement and inspection points.

Table 6-5. Auxiliary Drive Input Drive Subassembly Repair Standards

Fig no	Ref letter	Point of measurement	Size and fit of new parts	Wear limits
6-16	A	OD of input shaft bearing	3.5433 to 3.5427	*
6-16	B	ID of input shaft bearing	2.1648 to 2.1654	*
6-16	C	ID of input shaft bearing bore in carrier	3.5428 to 3.5442	3.5452
6-16	A-C	Fit of input bearing OD to ID of carrier bore	0.0005T to 0.0015L	0.0025L
6-16	D	Input shaft external spline measurement over 0.2400 diameter pins	2.2294 to 2.2275	2.2225
6-16	E	OD of input shaft bearing surface	2.1660 to 2.1655	2.1645
6-16	B-E	Fit of input shaft bearing surface OD to ID of bearing	0.0012T to 0.0001T	0.0009L

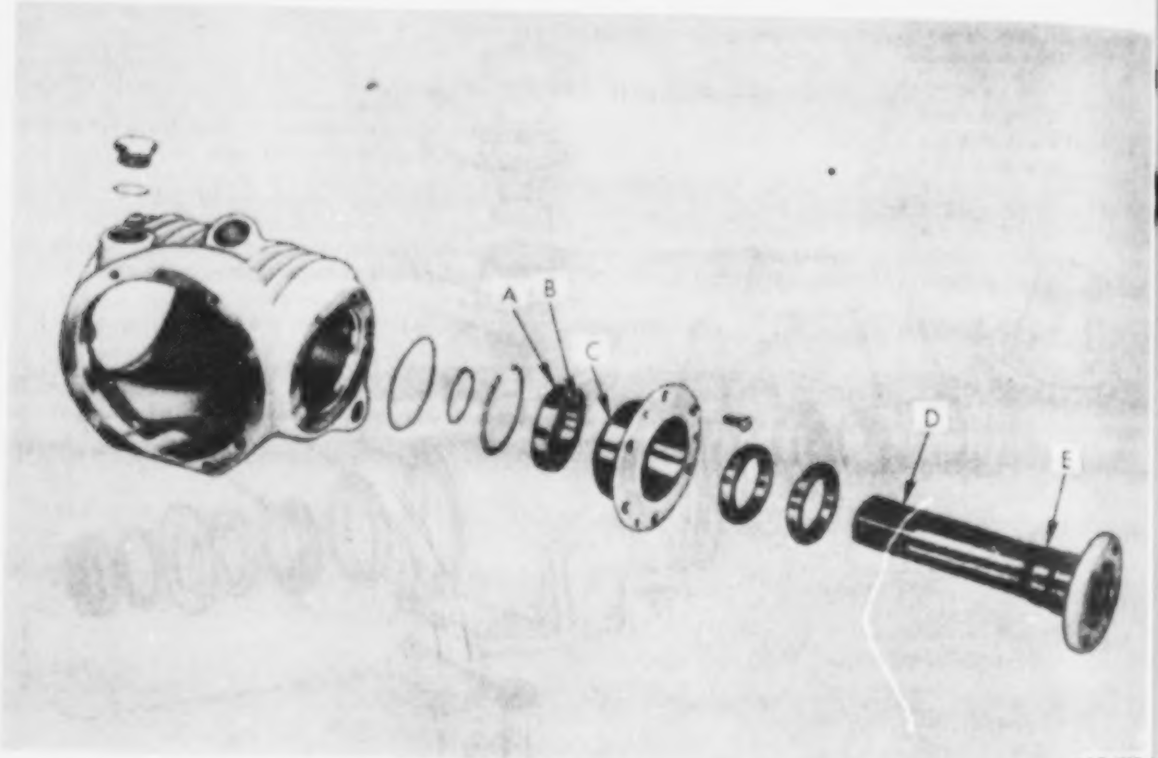


Figure 6-16. Auxiliary drive input drive subassembly measurement and inspection points.

6-43. Torque Values

Screws and nuts are torqued to standard values except as noted in table 6-6.

Table 6-6. Auxiliary Drive Assembly Torque Values

Fig. no.	Ref. letter	Location	Torque
6-1	C	Drive clutch shaft retaining nut	180 ± 20 lb ft
6-9	A	Spiral drive gear retaining nut	15 - 25 lb in.
6-10	R	Spiral pinion gear retaining nut	15 - 25 lb in.

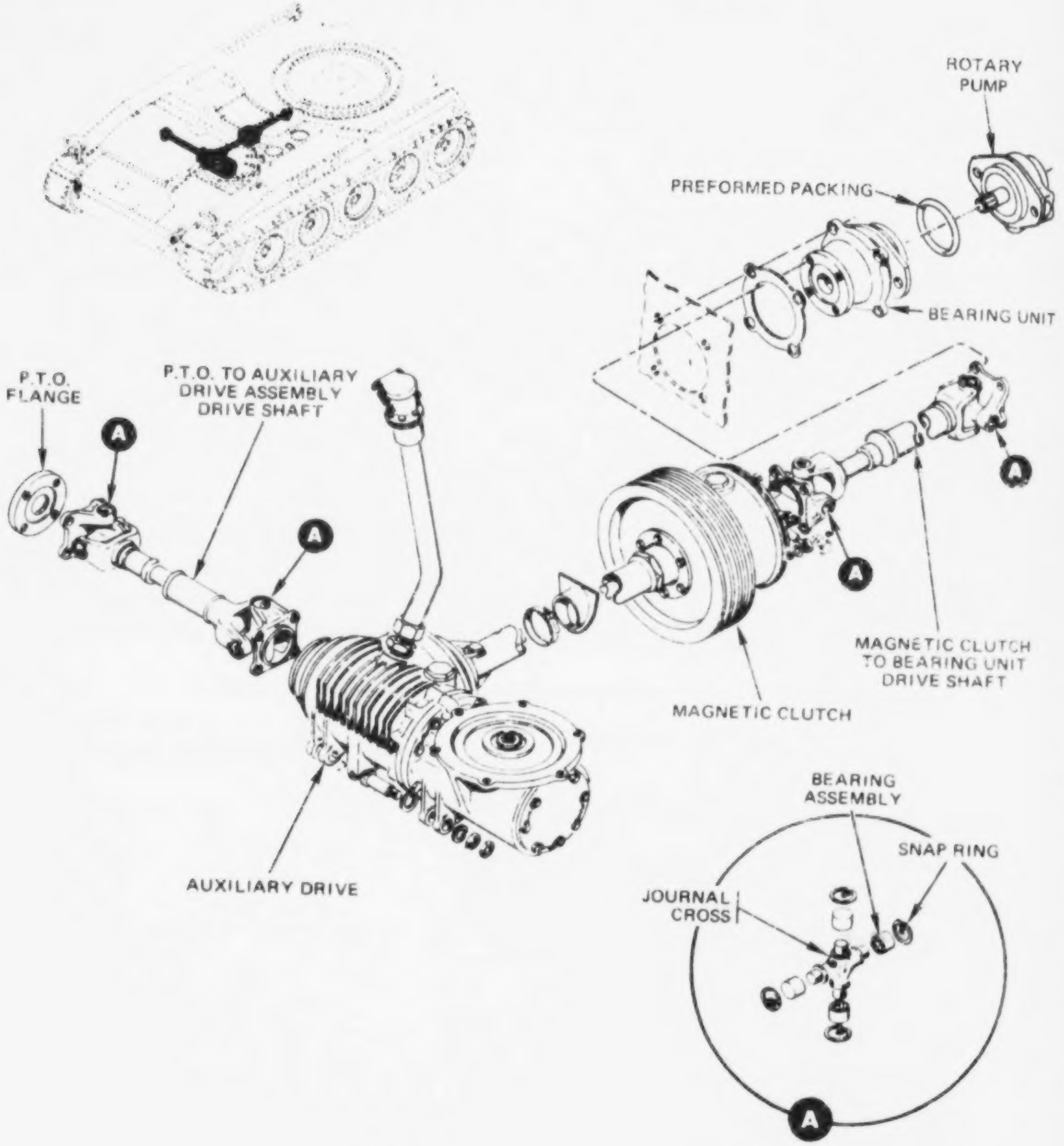
CHAPTER 7
DRIVE SHAFTS AND BEARING UNIT REPAIR

Section I. DESCRIPTION AND DATA

7-1. Description

a. Drive Shafts (fig. 7-1). Two drive shafts, a PTO flange and a carrier bearing unit are used to couple engine power to the auxiliary drive assembly and from the auxiliary drive assembly to the hydraulic pump. Power from the power take-off (PTO) unit is coupled to the auxiliary drive input by the PTO flange and PTO to auxiliary drive assembly drive shaft. Power from the auxiliary drive assembly magnetic clutch is coupled to the carrier bearing unit by the magnetic clutch-to-bearing unit drive shaft. Power is coupled from the bearing unit by splines to the hydraulic pump that is mounted on the turret well forward bulkhead.

b. Bearing Unit. The carrier bearing unit is mounted in the turret well forward bulkhead. The unit consists of ball bearing supported input and output flanges that provide angular in-line coupling for the magnetic clutch to the hydraulic pump.


ROTARY PUMP
PREFORMED PACKING
BEARING UNIT
P.T.O. FLANGE
P.T.O. TO AUXILIARY DRIVE ASSEMBLY DRIVE SHAFT
A
A
A
A
MAGNETIC CLUTCH TO BEARING UNIT DRIVE SHAFT
MAGNETIC CLUTCH
AUXILIARY DRIVE
BEARING ASSEMBLY
SNAP RING
JOURNAL CROSS
A

TA 041811

Figure 7-1. Auxiliary drive assembly drive shafts, bearing unit and PTO flange.

7-2. Data

a. PTO to Auxiliary Drive Assembly Drive Shaft.

Military number 10910330

Maximum telescoping length ...... 19 in. (adjustment — 2-$\frac{11}{32}$ in.)

b. Magnetic Clutch to Bearing Unit Drive Shaft.

Military number 10921732

Maximum telescoping length ... 23-$\frac{3}{4}$ in. (adjustment — 2-$\frac{11}{32}$ in.)

c. Carrier Bearing Unit.

Military number 10902580

Section II. AUXILIARY DRIVE ASSEMBLY DRIVE SHAFT REPAIR

7-3. General

The two drive shafts are identical in construction excepting the overall adjustable maximum length. The repair procedures given below are applicable for all drive shafts.

7-4. Repair

Repair of the drive shaft assemblies and PTO flange is limited to replacement of universal joint bearing assemblies, jounral cross assembly and snap rings. When the drive shaft yoke or shaft is damaged, the entire shaft is replaced as an assembly. When the PTO flange is damaged, the flange is replaced. Refer to TM 9-2300-216-20 for the disassembly, cleaning, inspection, repair and assembly of the universal joint assemblies.

Section III. CARRIER BEARING UNIT REPAIR

7-5. General

This section provides information for the disassembly, cleaning, inspection, repair and assembly of the carrier bearing unit.

7-6. Carrier Bearing Unit Disassembly

(Fig. 7-2)

a. Pull coupling from center of input flange.

b. Straighten tangs of key lock washer and remove round nut, using spanner wrench (NSN 5120-00-860-9576).

c. Remove key lock washer and pull input flange from bearing housing.

d. Drive nut plate from input flange, using a soft metal drive or punch.

NOTE

Nut plate is staked in place.

CAUTION

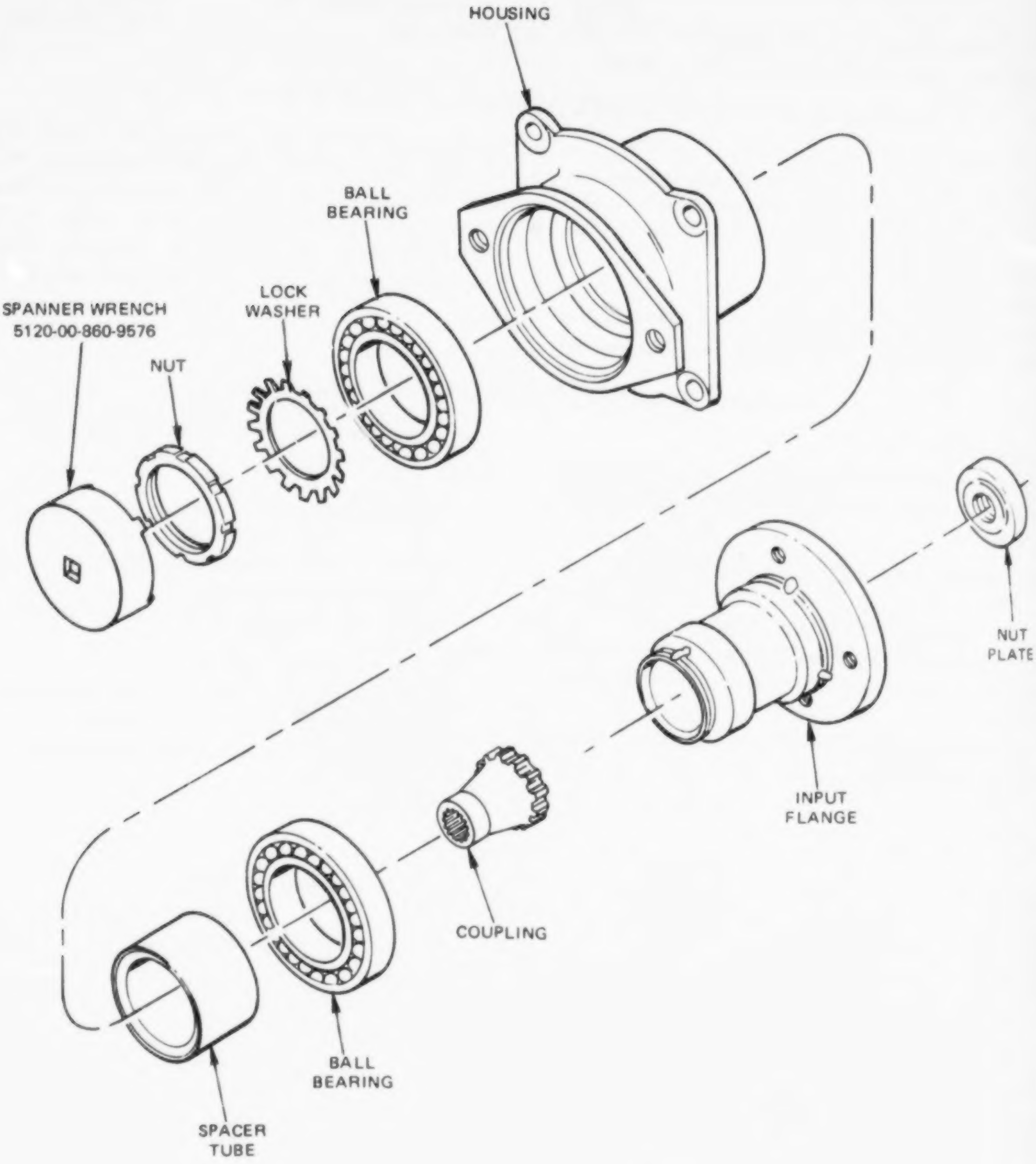
Do not scar or damage bearings or housing when removing bearings.

e. Drive both bearings from housing, using a soft metal drive.

NOTE

Bearings rest on internal shoulders within the housing and must be driven outward.

f. Remove spacer tube from bearing housing.


HOUSING
BALL
BEARING
LOCK
WASHER
SPANNER WRENCH
5120-00-860-9576
NUT
NUT
PLATE
INPUT
FLANGE
COUPLING
BALL
BEARING
SPACER
TUBE

TA 011812

Figure 7-2. Bearing unit disassembly or assembly.

7-7. Cleaning

a. Clean bearings in accordance with TM 9-214.

b. Clean all metal parts with dry-cleaning solvent (SD-2).

CAUTION

Do not spin bearings with compressed air.

c. Dry all metal parts with clean, dry, low pressure compressed air.

d. Coat small unpainted parts with oil (OE-HDO) to prevent corrosion or rusting.

e. Remove corrosion from non-bearing surfaces with wire brush and crocus cloth.

7-8. Inspection

a. Inspect all parts for physical damage, breaks, cracks, sharp ragged edges, deformation, rusted or deteriorated areas and for chipped or cracked paint.

b. Inspect round nut and input flange threaded areas for clean undamaged condition and for evidence of having been cross-threaded.

c. Inspect bearings as prescribed in TM 9-214.

d. Inspect and measure parts for wear in accordance with repair standards table 7-1 and figure 7-3.

7-9. Repair

a. Remove sharp jagged edges with a fine mill file and smooth with crocus cloth.

b. Sand down chipped, cracked or rusted painted areas and prime per specification TT-P-659. Touch up using white enamel, specification TT-E-489.

c. Repair damaged threaded areas with thread chaser or dull die.

d. Smooth down stake marks in input flange with fine mill file and smooth with crocus cloth.

e. Replace defective non-repairable parts and parts worn beyond wear limits specified in repair standards table 7-1.

7-10. Carrier Bearing Unit Assembly

a. Pack bearings and bearing housing cavity with grease (GAA).

b. Press first bearing into housing with seal facing out.

c. Install spacer tube into housing and press second bearing with seal facing out.

CAUTION

Make sure bearing housing and bearings are solidly packed with grease (GAA). Bearing carrier cannot be externally lubricated.

d. Apply a thin even coating of grease (GAA) to all surfaces of input and output flanges.

e. Install nut plate into input flange and stake securely in eight places.

f. Install input flange into bearing housing.

g. Install key lock washer and nut on input flange and tighten securely with spanner wrench (NSN 5120-00-860-9576).

h. Bend tangs of key lock washer into nut grooves and secure nut.

i. Install coupling in input flange.

Section IV. CARRIER BEARING UNIT REPAIR STANDARDS

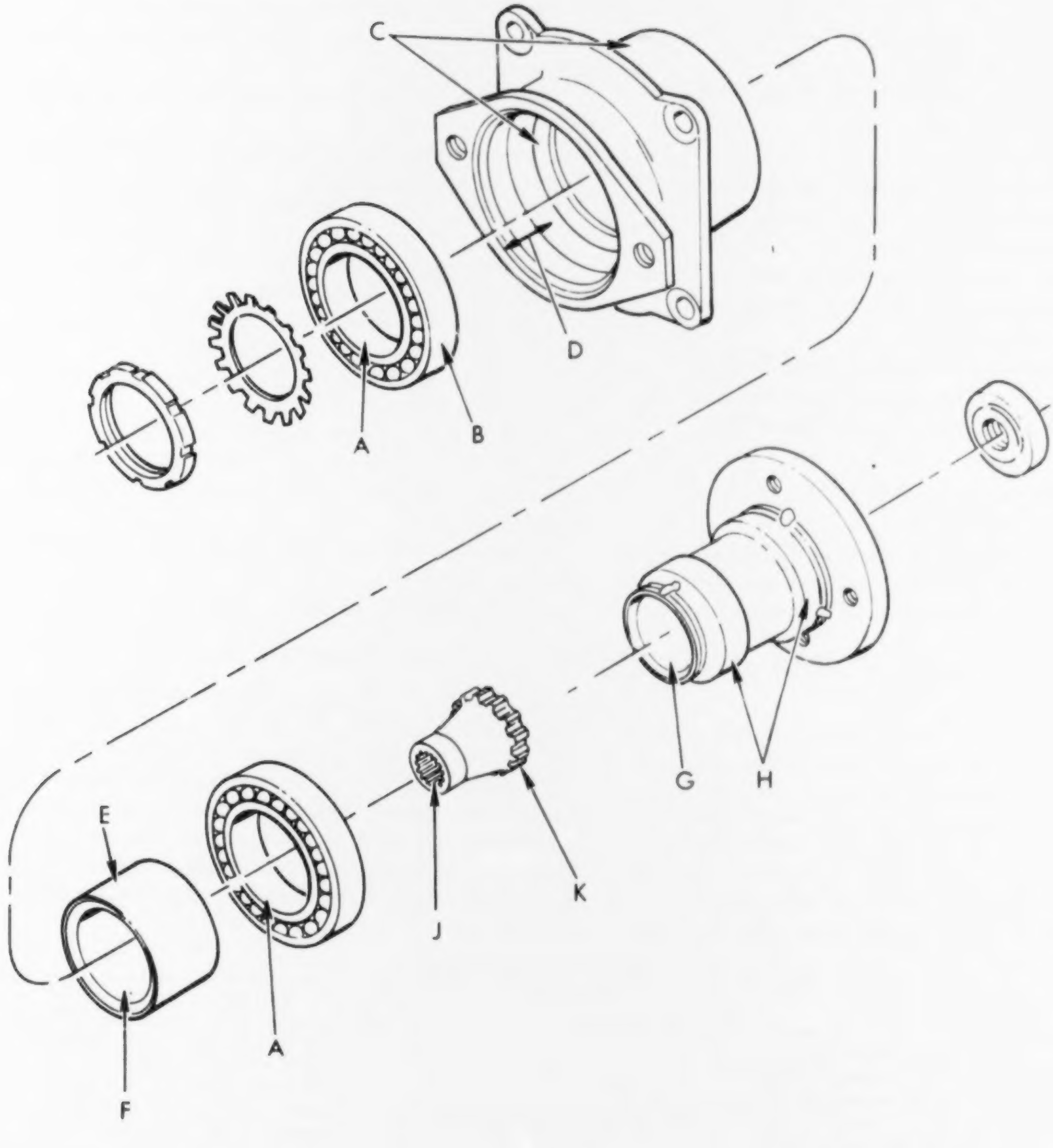
7-11. General

Repair standards for the carrier bearing unit are listed in table 7-1 and illustrated on figure 7-3. The reference letters on the illustration are shown in the second column of the table. Each item in the table indicates the point of measurement or inspection, part name, size and fit of new part, wear limits, and code symbols to coordinate information. Wear limits indicate that point to which a part or parts may be worn before replacement in order to obtain maximum service with minimum replacement. The suffix letter L indicates a loose or clearance fit between two parts. The suffix letter T indicates a tight or interference fit between two parts. The asterisk (*) indicates that tolerances on an individual part must be the same as on a new part. Clean grease from surfaces and wet mating surfaces with sealing compound Grade B, specification MIL-S-22473.

Table 7-1. Carrier Bearing Unit Repair Standards

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
7-3	A	ID of bearing (2 places)	2.5585 to 2.5591	2.5600
7-3	B	OD of bearing (2 places)	3.9364 to 3.9370	*
7-3	C	ID of bearing bore in housing (2 places)	3.9370 to 3.9375	3.9390
7-3	C-B	Fit of housing bearing carrier bore ID to OD of bearing (2 places)	0.0000 to 0.0011L	0.0026L
7-3	D	Length over shoulders	1.8750 to 1.8800	*
7-3	E	Length of tube	1.8800 to 1.8850	1.8750
7-3	F	ID of tube	2.5600 to 2.5650	2.5700
7-3	G	Input flange spline: measurement between 0.2160 pins	1.5521 to 1.5548	1.5598
7-3	H	OD of bearing surface on input flange (2 places)	2.5592 to 2.5597	*
7-3	H-A	Fit of input flange bearing surface OD to ID of bearing	0.0012T to 0.0001T	0.0008L
7-3	H-F	Fit of bearing surface on input flange OD to ID of tube	0.0003L to 0.0058L	0.0108L
7-3	J	*Internal spline on coupling: measurement between 0.1080 pins	0.6506 to 0.6531	0.6561
7-3	K	External spline on coupling: measurement over 0.2400 pins	2.2254 to 2.2274	2.2194

*Refer to table 12-1 for the fit to the rotary pump input shaft.


C
D
A
B
G
H
E
J
K
A
F

TA 011813

Figure 7-3. Carrier bearing unit measurement and inspection points.

CHAPTER 8
ENGINE COOLING SYSTEM REPAIR

Section I. DESCRIPTION AND DATA

8-1. Description and Operation

The cooling system consists of two radiators, a surge tank, water pump, oil cooler, cooling fan, two thermostats, aeration detector ("B" vehicles), interconnecting lines, hoses, and ducts. The water pump drains water from the bottom of both radiators and the surge tank, forcing it through the oil cooler into the engine water jackets. When the engine is at normal operating temperature, the water passes through the thermostats to the radiators with a portion circulating through the surge tank. When starting a cold engine, or when the water is below operating temperature, the thermostats are closed, causing the water to flow through the bypass tube back to the water pump intake. The surge tank collects air in the cooling system caused by aeration of the coolant or compression leaks, and vents the air to atmosphere when pressure exceeds 14 psig. The aeration detector warns the driver of air trapped in the cooling system or of low coolant level, ("B" vehicles). Air is collected from the radiators and the engine water pump elbow. The cooling fan draws air for the power plant and radiators through deck grilles in the front of the turret deck and top of the vehicle and forces the air through the two radiators into the engine compartment. Air in the engine compartment flows on all sides of the power plant and is exhausted through grilles on the right side of the vehicle.

8-2. Data

Radiators:	
Military number	10900400
Manufacturer	Perfex Corporation Milwaukee, Wisconsin
Dimensions	39-¼ in. h x 24 in. w x 5 in. deep
Coolant flow (each radiator)	70 gpm
Top tank temperature	210°F.
Weight (each)	73 lbs.
Coolant fan:	
Manufacturer	Industrial Design Laboratories Incorporated Culver City, California
Military number	10956561
Design and construction data:	
Outside diameter (fan housing)	27 inches
Fan assembly length (overall)	15 inches
Weight	120 lbs.
Direction of rotation (view from pulley end)	Clockwise
Direction of air flow	Through fan, into engine compartment
Number of mounting holes	16
Bolt circle diameter	25.75 inches

Fan performance data:

Air flow and pressure	Fan RPM		
Standard air density	*3,500*	*4,100*	*5,120*
Cubic feet per minute (CFM)	12,400	14,500	18,200
Power required (HP)	19.8	31.9	61.0
Static pressure (inches water)	6.1	8.5	11.1

Section II. RADIATOR, SURGE TANK, AERATION DETECTOR AND ASSOCIATED PARTS REPAIR

8-3. General

This section provides information for the disassembly, cleaning, inspection, repair and assembly of the radiator, surge tank, aeration detector and associated parts repair.

8-4. Aeration Detector Repair ("B" Vehicles)

Repair of the aeration detector assembly consists of replacement of a defective item with a new serviceable assembly. Refer to TM 9-2300-216-20 for replacement procedures.

8-5. Radiator and Surge Tank Disassembly

Disassemble both radiator assemblies and surge tank assembly. For disassembly procedures, refer to TM 9-2300-216-20.

8-6. Cleaning

a. Clean all metal parts with dry-cleaning solvent (SD-2).

b. Dry metal parts with clean, dry, low pressure compressed air.

c. Coat small unpainted parts with clean engine oil (OE/HDO) to prevent rusting.

d. Reverse flush radiator core. For procedure, refer to TM 750-254.

e. Clean rubber surfaces with a clean lint-free cloth dampened (not saturated) with dry-cleaning solvent (SD-2). Do not allow solvent to dry on surface but immediately wipe dry with a clean, dry, lint-free cloth.

8-7. Inspection and Repair

a. Inspection.

(1) Inspect all parts for physical damage, breaks, cracks, deformation, rust or corroded areas, and chipped or damaged paint.

(2) Inspect rubber parts for holes, rips, tears or thin areas.

(3) Inspect all threaded parts for worn or damaged threads.

(4) Inspect radiator cores for evidence of damage or leaks.

b. Repair.

(1) File down all sharp ragged edges.

(2) Weld small breaks and cracks.

NOTE

Care should be taken during repairs that involve welding. Closing off of tubes inside radiators will result in loss of cooling capability and engine overheating.

(3) Sand paint damaged areas and touch-up as follows: apply one coat of primer (MIL-P-8585) on aluminum alloy and (TT-P-659) to steel surfaces and allow to dry a minimum of 30 minutes. Apply one coat of enamel (White enamel, Federal Specification TT-E-489) to primed surface and allow to dry.

(4) Straighten deformed parts.

(5) Replace all hoses that show signs of wear or deterioration.

(6) Repair leaks in radiator core. For procedure, refer to TM 750-254, TM 9-450.

(7) Replace all defective attaching hardware.

(8) Replace all non-repairable defective parts.

8-8. Radiator and Surge Tank Assembly

Assemble both radiator assemblies and surge tank assembly. For procedures, refer to TM 9-2300-216-20.

Section III. COOLING FAN (10956561) REPAIR

8-9. General

This section provides information for the disassembly, cleaning, inspection, repair and assembly of the cooling fan.

8-10. Cooling Fan (10956561) Disassembly

(Fig. 8-1)

a. Remove seven screws securing ring assembly to housing and separate ring assembly from housing.

b. Remove four screws attaching plate, packing, plate and bearing to ring assembly.

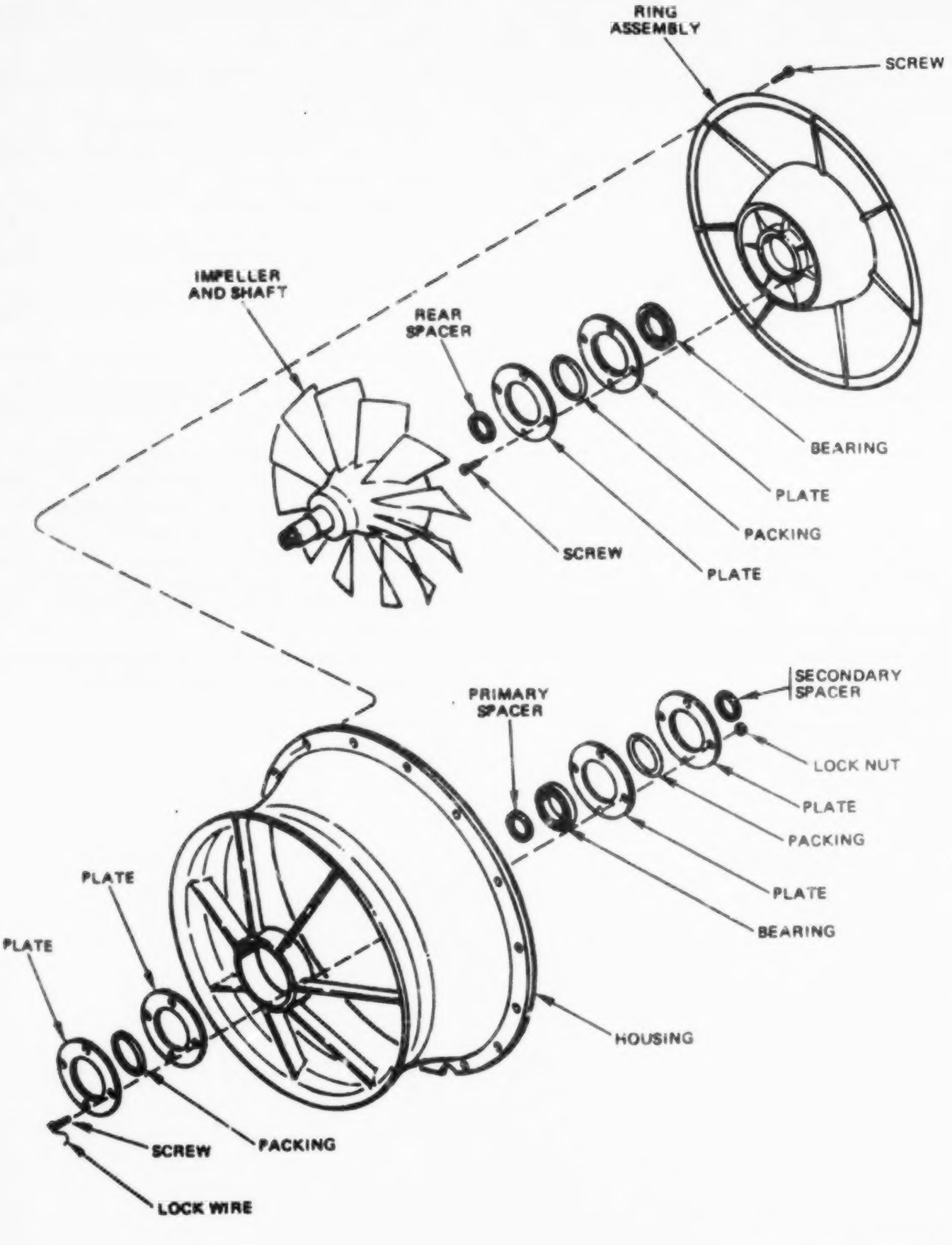
c. Remove bearing from ring assembly using suitable bearing puller.

d. Remove impeller, bearing and shaft from housing.

e. Remove lock wire from four screws attaching plates to housing hub.

f. Remove four screws and lock nuts attaching plates to bearing hub and remove two plates and packing from outer side of housing hub and two plates and packing from inner side of housing hub.

g. Remove bearing and two spacers from housing hub using suitable puller.


RING ASSEMBLY
SCREW
IMPELLER AND SHAFT
REAR SPACER
BEARING
PLATE
PACKING
SCREW
PLATE
PRIMARY SPACER
SECONDARY SPACER
LOCK NUT
PLATE
PACKING
PLATE
BEARING
PLATE
PLATE
HOUSING
SCREW
PACKING
LOCK WIRE

AT 46350

Figure 8-1. Cooling fan (10866861) disassembly or assembly.

8-11. Cleaning

a. Clean all metal parts, except bearings, with drycleaning solvent (SD-2).

b. Dry all metal parts, except bearings, with clean, dry, low pressure compressed air.

c. Coat all small unpainted parts with clean engine oil (OE/HDO) to prevent rusting.

CAUTION

Do not spin bearings with compressed air.

d. Clean bearings in accordance with TM 9-214.

8-12. Inspection and Repair

a. Inspection.

(1) Inspect all parts for breaks, cracks, deformation, and rust or corrosion.

(2) Inspect attaching hardware for worn or damaged threads.

(3) Inspect bearings in accordance with TM 9-214.

(4) Inspect impeller carefully for nicks or dents in blades.

(5) Inspect ring assembly and casing for cracks or dents.

b. Repair.

(1) Replace all defective attaching hardware.

(2) Repair to cooling fan consists of installing new parts provided in repair kit.

CAUTION

Do not attempt major repair of the impeller. This is a balanced unit and must be replaced if cracked or broken.

(3) Replace cooling fan with a new serviceable fan if impeller is damaged.

(4) Repair minor damage to exterior of ring assembly and casing only.

8-13. Cooling Fan (10956561) Assembly (Fig. 8-1)

a. Coat bearings with grease (GAA).

b. Install secondary spacer and rear spacer on impeller shaft.

c. Install bearing into hub of ring assembly using a suitable press.

d. Install two plates and packing on ring assembly securing with four screws.

e. Place plate, packing and plate over housing end of impeller shaft.

f. Install bearing and primary spacer onto bearing journal of impeller shaft using suitable press.

g. Install housing end of impeller shaft into housing hub.

h. Place two plates and packing on outer side of housing hub and aline mounting holes in plates with mounting holes on inner side of housing hub.

i. Secure plates to hub with four screws and lock nuts, tighten screws and secure by lock wiring.

j. Install ring assembly onto impeller shaft and aline mounting holes in ring assembly with mounting holes in housing.

k. Install seven screws attaching ring assembly to housing and tighten screws to secure.

CHAPTER 9
ENGINE AIR CLEANER SYSTEM REPAIR

Section I. DESCRIPTION AND DATA

9-1. Description and Operation

a. The engine air cleaner system consists of an air filter, separator assembly, air separator blower, filter bags, and associated ducting (fig. 9-1).

b. The air necessary for operation of the diesel engine is supplied by a two-stage, dry-air cleaner system. Atmospheric air is drawn through the battery compartment grilles into vortex type air separators. The vortex type air separators consist of a system of tubes and deflector vanes that impart a swirling motion to the incoming air. This swirling action centrifuges most of the large dust particles against the walls of the tubes. The dust falls into the dust chamber and is exhausted to the atmosphere through ports on the left side of the vehicle by the air separator blowers. The intake air then passes through replaceable fabric filters which collect the remaining dust. The clean air is then routed through ducts and through the turbocharger to the engine blower and combustion chambers.

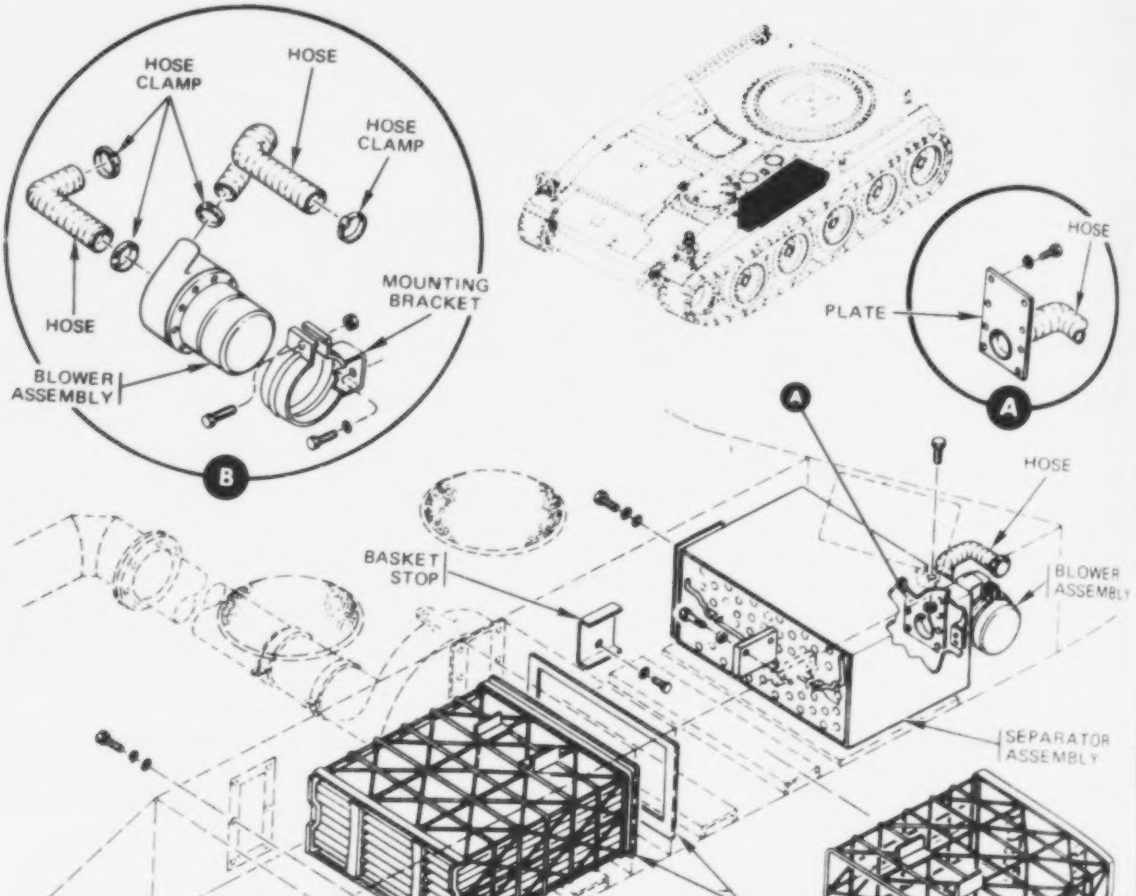

HOSE CLAMP
HOSE
HOSE CLAMP
HOSE
MOUNTING BRACKET
BLOWER ASSEMBLY
B
HOSE
PLATE
A
A
HOSE
BLOWER ASSEMBLY
BASKET STOP
SEPARATOR ASSEMBLY
SEAL
BASKET ASSEMBLY
BAG ASSEMBLY
GASKET
B
HOSE ADAPTER
SEPARATOR ASSEMBLY
PLATE
SPACER
TA 011814

Figure 9-1. Engine air cleaner system.

9-2. Data

Bag Assembly:	
Military number	10913223
Basket Assembly:	
Military number	11643006
Separator Assembly:	
Military number	10913222
Blower Assembly:	
Military number	10905010

Section II. ENGINE AIR CLEANER COMPONENTS REPAIR

9-3. General

This section provides references to repair instructions for air cleaner components.

9-4. Bag and Basket Repair

Disassemble, clean, inspect, repair and assemble bag and basket. For procedures, refer to TM 9-2300-216-20.

9-5. Air Separator Blower Repair

Disassemble, clean, inspect, repair and assemble air separator blower. For procedures, refer to TM 9-2300-216-20.

9-6. Air Intake Separator Repair

Disassemble, clean, inspect, repair and assemble air intake separator. For procedures, refer to TM 9-2300-216-20.

9-7. Air Intake Ducting Repair

Disassemble, clean, inspect, repair and assemble air intake ducting. For procedures, refer to TM 9-2300-216-20.

CHAPTER 10
DRIVER'S CONTROLS AND LINKAGES REPAIR

Section I. DESCRIPTION

10-1. Description and Operation

The driver's controls consist of the controls and associated linkage for controlling the operation of the vehicle steering, shifting, throttle and accelerator, and the service and parking brakes. Linkage from the driver's compartment controls to the associated controls in the power plant compartment consists of rods, rod end bearings, bellcranks, levers, cables, sleeve and roller bearings, control levers, bars, handles, pedals and associated attaching parts.

Section II. STEERING CONTROLS AND LINKAGE REPAIR

10-2. General

For removal, disassembly, cleaning, general inspection, general repair, assembly and adjustment of the steering controls and linkage refer to TM 9-2300-216-20.

10-3. Inspection and Repair

a. Inspection. Inspect all parts of the steering controls and linkage per procedures in TM 9-2300-216-20.

b. Repair. Repair all parts of the steering controls and linkage per procedures in TM 9-2300-216-20.

Section III. SHIFTING CONTROLS AND LINKAGE REPAIR

10-4. General

For removal, disassembly, cleaning, general inspection, general repair, assembly and adjustment of steering controls and linkage refer to TM 9-2300-216-20.

10-5. Inspection and Repair

a. Inspection. Inspect all parts of the shifting controls and linkage per procedures in TM 9-2300-216-20.

b. Repair. Repair all parts of the shifting controls and linkage per procedures in TM 9-2300-216-20.

Section IV. THROTTLE AND ACCELERATOR CONTROLS AND LINKAGE REPAIR

10-6. General

For removal, disassembly, cleaning, general inspection, general repair, assembly, and adjustment of throttle and accelerator controls and linkage refer to TM 9-2300-216-20.

10-7. Inspection and Repair

a. Inspection. Inspect all parts of the throttle and accelerator controls and linkage per procedures in TM 9-2300-216-20.

b. Repair. Repair the throttle and accelerator controls and linkage per procedures in TM 9-2300-216-20.

Section V. SERVICE AND PARKING BRAKE CONTROLS AND LINKAGE REPAIR

10-8. General

For removal, disassembly, cleaning, general inspection, general repair, assembly and adjustment of the service and parking brake controls and linkage refer to TM 9-2300-216-20.

10-9. Inspection and Repair

a. Inspection. Inspect all parts of the service and parking brake controls and linkage per procedures in TM 9-2300-216-20.

b. Repair. Repair the service and parking brake controls and linkage per procedures in TM 9-2300-216-20.

CHAPTER 11
ELECTRICAL COMPONENTS AND WIRING HARNESSES REPAIR

Section I. DESCRIPTION AND DATA

11-1. Description and Operation

a. The vehicles are equipped with electrical circuits that provide 24-volt direct-current power to all of the vehicle electrical components. The electrical system is comprised of ten general categories as follows: battery and master relay; generator and voltage control "A" vehicles or voltage regulator "B" vehicles; starter; bypass solenoid valve; electrical switch, indicator, gage, accessory; lighting; transmitters; filter bypass; and wire harnesses and leads.

b. Refer to TM 9-2815-202-34 for starter description and data. Refer to TM 9-2920-224-35 for generator description and data. Refer to TM 9-6140-200-12 for batteries description and data. Refer to TM 9-2300-216-20 for electrical schematic diagrams and descriptions and data of all other electrical system components not described in paragraph *d* below.

c. The tube axial fan, in the driver's compartment, forces air through a duct system to the top of the generator. The air flows through the generator, out the scroll housing, and through an exhaust duct that discharges into the battery compartment on the M107 Gun Vehicles serial number 1 through 353 and on the M110 Howitzer Vehicles serial number 1 through 512. On the M107 Gun Vehicles serial number 354 and subsequent, the M110/M110A1 Howitzer Vehicles serial number 513 and subsequent, and M11A1 Howitzer vehicles serial number 354-1 and subsequent, the air exhausts through the scroll housing into the engine compartment.

d. The engine generator voltage control assembly (in conjunction with the voltage control rheostat, "A" vehicles) regulates the voltage output of the generator. The voltage regulator used in "B" vehicles is a solid state unit and does not require a separate voltage control rheostat.

e. All vehicle wiring is fabricated from standard ordnance waterproof cable. Wiring harness terminations are made from waterproof, single-wire, quick-disconnect connectors; multi-pin, plug receptacle connectors; or solderless, waterproof terminals. The quick-disconnect connector consists of mating male and female shells. The plug receptacle connector consists of pins and sockets that are held together by a coupling nut. Circuit number identifying marker bands are fastened to the wiring near the terminal connections.

11-2. Data

Tube Axial Fan:	
Military number	10898759
Generator Voltage Control ("A" Vehicles):	
Military number	8723894
Generator Regulator ("B" Vehicles):	
Military number	11659111

Section II. TUBE AXIAL FAN REPAIR

11-3. General

This section provides information for the disassembly, cleaning inspection, repair and assembly of the tube axial fan.

11-4. Tube Axial Fan (10898759) Repair

Repair tube axial fan. For repair procedures, refer to TM 9-2920-224-35.

Section III. GENERATOR VOLTAGE CONTROL ASSEMBLY REPAIR

11-5. General

This section provides information for the disassembly, cleaning, inspection, repair and assembly of the generator voltage control assembly ("A" vehicles). Repair of the generator voltage regulator assembly consists of replacement of the unit with a new serviceable assembly ("B" vehicles). Refer to TM 9-2300-216-20 for removal procedures.

11-6. Generator Voltage Control Disassembly, "A" Vehicles

(Fig. 11-1)

a. Loosen four captive screws attaching mounting brackets to voltage control assembly and remove brackets from cover.

b. Remove inspection seal, six screws and lock washers and remove top cover and preformed packing from case.

c. Remove eight screws attaching BATTERY and GENERATOR electrical receptacles to case.

d. Remove inspection seal, six screws and lock washers attaching case to regulator assembly.

e. Remove two screws, lock washers and loop clamps attaching receptacle cables to case and regulator assembly.

f. Disconnect four cable terminal strips from regulator terminal block.

g. Remove two screws from each of two busses attached to the BATTERY and GENERATOR receptacle.

h. Remove BATTERY and GENERATOR receptacles, cables and gaskets from case.

i. Remove case and preformed packing from regulator assembly.

j. Remove six screws from bottom of regulator assembly attaching relay assembly and remove relay assembly from regulator assembly.

k. Remove four drive screws securing identification plate to case, only if required for replacement, and remove identification plate.

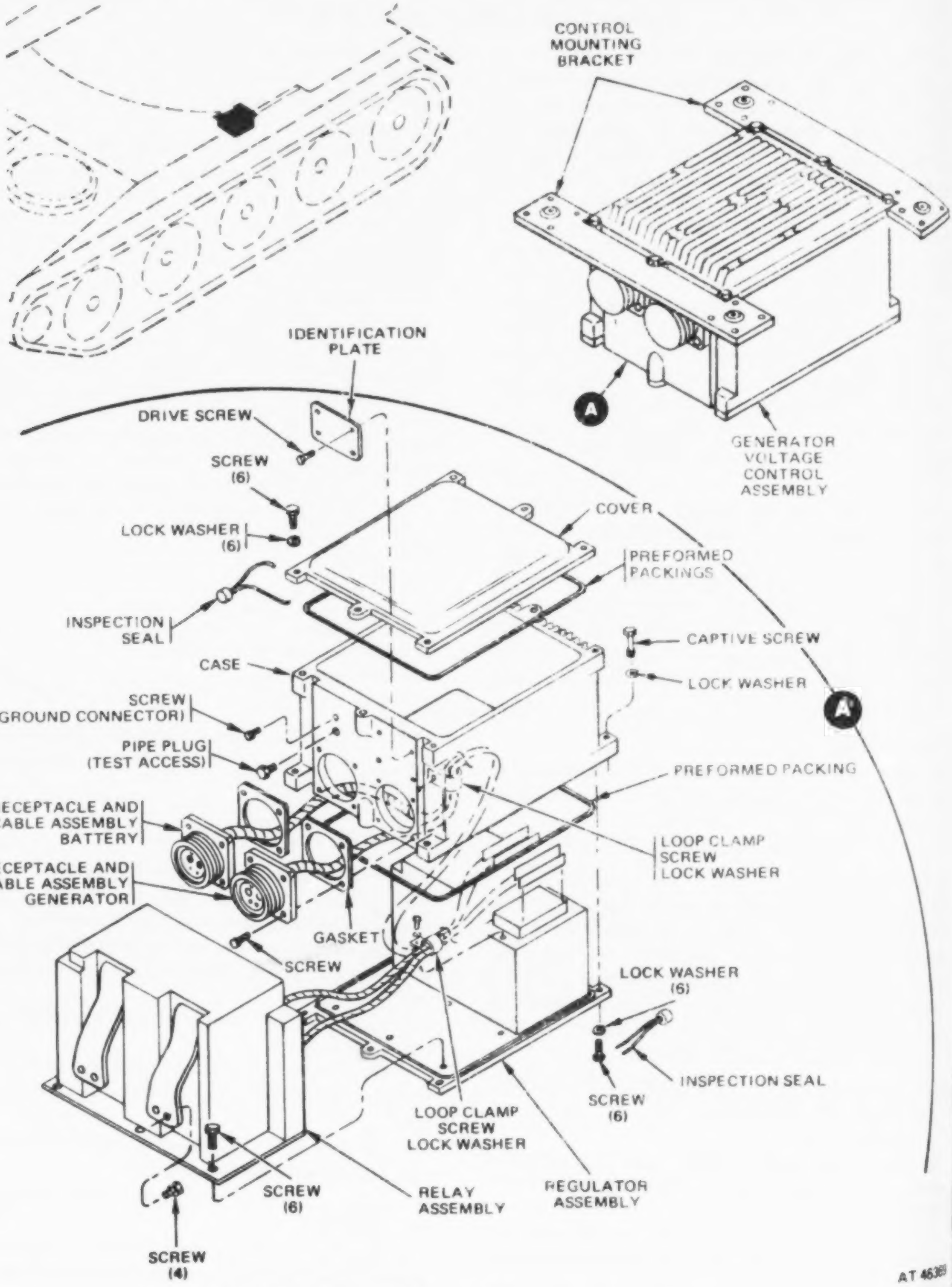

CONTROL MOUNTING BRACKET
A
GENERATOR VOLTAGE CONTROL ASSEMBLY
IDENTIFICATION PLATE
DRIVE SCREW
SCREW (6)
LOCK WASHER (6)
INSPECTION SEAL
CASE
SCREW (GROUND CONNECTOR)
PIPE PLUG (TEST ACCESS)
RECEPTACLE AND CABLE ASSEMBLY BATTERY
RECEPTACLE AND CABLE ASSEMBLY GENERATOR
GASKET
SCREW
COVER
PREFORMED PACKINGS
CAPTIVE SCREW
LOCK WASHER
A
PREFORMED PACKING
LOOP CLAMP SCREW LOCK WASHER
LOCK WASHER (6)
INSPECTION SEAL
SCREW (6)
LOOP CLAMP SCREW LOCK WASHER
REGULATOR ASSEMBLY
RELAY ASSEMBLY
SCREW (6)
SCREW (4)
AT 46369

Figure 11-1. Generator voltage control disassembly or assembly ("A" vehicles).

11-7. Cleaning, "A" Vehicles

a. Clean all metal parts with dry-cleaning solvent (SD-2).

b. Dry clean parts with clean, dry, low pressure compressed air.

c. Clean wiring with a clean dry cloth.

d. Clean contact surfaces of relay assembly bosses with fine grit sandpaper (400 grit).

11-8. Inspection and Repair, "A" Vehicles

a. Inspection.

(1) Inspect all parts for breaks, cracks, deformation or rusted surfaces.

(2) Inspect electrical wiring for frayed or damaged insulation.

(3) Inspect pins in terminal strips for damage or corrosion.

(4) Inspect attaching hardware for worn or damaged threads.

b. Repair.

(1) Replace preformed packings.

(2) Sand down chipped, cracked or corroded painted areas and touch up using enamel to match existing color, white enamel, Federal Specification TT-E-489.

(3) Replace all defective attaching hardware.

(4) Replace all defective non-repairable parts with new serviceable parts.

11-9. Generator Voltage Control Assembly, "A" Vehicles

(Fig. 11-1)

Assemble generator voltage control assembly in reverse order in disassembly (para 11-6).

Section IV. MISCELLANEOUS ELECTRICAL COMPONENTS REPAIR

11-10. Hull Miscellaneous Components Repair.

Refer to TM 9-2300-216-20 for information on disassembly, cleaning, inspection, repair and assembly of the following components.

a. Instrument (gage) panel

b. Instrument (switch) panel

c. Air box heater bracket ("A" vehicles)

d. Air box heater and fuel prime bracket ("B" vehicles)

e. Master relay

f. Pump relay

g. Master rectifier

h. Dome light

11-11. Starter Repair

For description, data and repair of the starter, refer to TM 9-2815-202-34.

11-12. Generator Repair

For description, data and repair of the generator, refer to TM 9-2920-224-35.

11-13. Batteries Repair

For description, data and repair of batteries, refer to TM 9-6140-200-12.

11-14. Electrical Wiring Harness Repair

a. General. This paragraph provides information for repair of wiring harnesses and leads. Table 11-1 provides a list of all electrical circuits and their description. Table 11-2 provides a list of circuits in each wiring harness, or lead, to facilitate continuity testing; the first column lists the wiring harness part number, the second column describes the harness or lead functionally, the third column lists the pin designation on connectors or receptacles, and the fourth column lists circuits terminating at each pin.

b. Repair. For information on repair of wiring harnesses, refer to TM 9-2300-216-20. Make all repairs in accordance with the following specifications.

(1) *Binding.* Cables shall be bound together with one-half over-lapping turns of black tape, 0.010 inch thick, ¾ inch wide and meet requirements of specification HH-I-595, or tape, Type EF-9, ¾ inch wide, black, and meet requirements of specification MIL-I-15126.

(2) *Crimping.* Crimp pin contacts (ferrules), terminals, and splicing connectors to cables (conductors and/or insulation) to meet performance requirements of specification MIL-T-13513.

(3) *Soldering.* Solder conductors to pin and socket contacts and (solder-type) terminals and terminal assemblies in accordance with requirements of specification MIL-STD-454.

(4) *Splices.* Spliced conductors must meet requirements of specification MIL-T-13513 for performance. Spliced conductors must be adequately insulated and the insulation must be sealed to each cable's insulation. Completed splices must meet the requirements of specification MIL-C-13486 for the following properties: high voltage to ground (high potential), fungus resistance, resistance to oil absorption, resistance to immersion in liquids, flammability, resistance to ozone, and high temperature resistance.

(5) *Plugging.* Plug all spare grommet holes with rod of diameter and length as required; Rod, laminated, thermosetting, Type I, Grade XX, specification L-P-509.

(6) *Potting.* Pot specified areas with sealing compound, Class Optional, specification MIL-S-8516.

(7) *Lacing.* Lace leads together using twine, Type P, Waxed, Class 2, specification MIL-T-713.

(8) *Marking.* Identify circuits, leads and wiring harnesses with marker bands per MIL-STD-130, with numbers as shown on tables of electrical circuits and wiring harnesses.

Table 11-1. Vehicle Electrical Circuits and Circuit Numbers

Circuit No.	Description
1	Generator field to generator voltage regulator.
2	Generator armature to generator voltage regulator.
3	Generator ground circuit.
5	Generator voltage regulator to battery main bus.
10	Feed to instrument panel and pump and igniter switch circuit breakers.
14	Starter switch to neutral-position switch and starter switch to instrument switch.
14A	Starter control relay to starter relay.
14B	Neutral-position switch to starter control relay coil.
14C	Starter relay to starter control relay.
14D	Circuit breaker to starter control relay coil.
15	Circuit breaker to vehicular light switch.
16	Vehicular light switch to dimmer switch.
17	Dimmer switch to headlight upper beam.
18	Dimmer switch to headlight lower beam.
19	Infrared marker light circuit.
20	Vehicular light switch to blackout marker lamps, front.
21	Vehicular light switch to service taillight and intervehicular connector.
22	Vehicular light switch to service stoplamp and intervehicular connector.
23	Vehicular light switch to blackout stoplamp and intervehicular connector.
24	Vehicular light switch to blackout marker lamps and intervehicular connector.
24A	Blackout marker lamp circuit to auxiliary outlet receptacle.
24B	Blackout marker lamp circuit to auxiliary outlet receptacle.
25	Spare (horn switch circuit if required).
27	Circuit breaker to instrument switch to instruments.
28	Fuel-level transmitter to fuel-level indicator.
33	Engine water-temperature transmitter to water-temperature indicator.
36	Engine oil-pressure transmitter to engine oil-pressure indicator.
37A	Auxiliary power feed.
38	Wire 37A to compartment light.
40	Vehicular light switch to panel light.
49	Auxiliary outlet receptacle feed.
50	Auxiliary outlet receptacle to ground.
53	Not used (intervehicular connector, marked brake).
75	Vehicular light switch to stoplight switch.
76	Circuit breaker to pump and igniter switch, and switch to 76A and 76C (air box heater).
76A	Wire 76 to fuel pump and motor (air box heater).
76C	Wire 76 to igniter (air box heater).
81	Battery and master relay to battery bus.
82	Battery bus to starter motor.
90A	Auxiliary outlet receptacle to ground.
90B	Auxiliary outlet receptacle to ground.
91	Headlight to ground.
137	Infrared receiver switch to utility outlet, and wire 147 to utility outlet.
147	Auxiliary power feed to fire-control connectors.
148	Intercommunication-system feed.
154	Rammer motor control circuit including switch and indicator.
155	Hydraulic oil pump motor circuit.
161	Hydraulic oil pump motor relay control circuit.
161A	Pressure switch to hydraulic pump motor switch.
174	Interlock switches to rammer shutoff solenoid valve.
174A	Tray interlock switch to elevating solenoid valve.
234	Suspension lockout indicator circuit.
317	Hydraulic pump clutch switch circuit.
317A	Hydraulic pump clutch switch to clutch.
321	Transmission oil-pressure transmitter to transmission oil-pressure indicator.
324	Transmission oil-temperature transmitter to transmission oil-temperature indicator.
345	Engine air cleaner blower circuits.
415	Generator to generator cooling fan.
459	Master relay to master switch control to indicator circuit and rectifier; diode assembly.
459A	Circuit breaker to rectifier.
459B	Circuit breaker to master control rectifier.
478	Generator equalizer circuit.
480	Fuel valve switch to fuel solenoid valve (air box heater).
480A	Fuel purge and prime switch to solenoid ("V" vehicles).
490	Blackout clearance.

Table 11-1. Vehicle Electrical Circuits and Circuit Numbers — Continued

Circuit No.	Description
506	Generator regulator to generator charge indicator; also to warning relay.
509	Engine and transmission warning light to warning relay.
509A,B,C	Low coolant warning light circuit ("B" vehicles).
509H	Warning relay to horn.
514	Infrared blackout selector switch to upper beam and dimmer switch infrared headlight.
515	Infrared blackout selector switch to infrared headlight lower beam and dimmer switch.
519	High beam indicator circuit.
520	Vehicular light switch to infrared blackout drive selector switch.
870	Traversing trigger switch to traversing solenoid valve.
872	Elevating trigger switches to elevating solenoid valve.
895	Traverse deceleration circuit.
950	External voltage control rheostat to generator regulator ("A" vehicles).

Table 11-2. Wiring Harness Intraconnection List

Harness or lead number	Description	Pin number	Circuit number
10892516	Battery positive-to-battery positive lead		
10892526	Suspension lockout system warning light and horn ground lead		Ground
10901827	Line connection-to-right headlamp disconnect wiring harness	Lighting harness connector	
		A	Blank
		B	18
		C	17
		D	20
		E	19
		F	514
		G	515
		H	25
10901829	Trailer receptacle to disconnect wiring harness	Trailer receptacle	
		A	24A, 24B, 490
		B	22
		C	24A, 24B, 490
		D	90A
		E	21
		F	23
		H	24A, 24B, 490
		J	22
		K	37A
		L	90B
10901835	Battery-to-circuit breaker lead		459B
10901838	Gages and lights disconnect-to-instrument panel wiring harness	Engine sending units disconnect	
		A	Ground
		B	321
		C	324
		D	33
		E	36
		F	27
		H	28
		J	509
		K	459
		L	506
		M	519
		N	519
10901839	Starter-to-ground lead		Ground
10901840	Bulkhead disconnect-to-generator armature lead	Bulkhead connector	2
10901842	Bulkhead disconnect-to-starter lead	Bulkhead connector	82
10901844	Bulkhead-to-bulkhead generator circuit lead		2
10901852	Bulkhead disconnect-to-voltage control assembly wiring harness	Voltage regulator connector	
		A	Blank
		B	Blank
		C	478
		D	1
		E	Blank

Table 11-2. Wiring Harness Intraconnection List — Continued

Harness or lead number	Description	Pin number	Circuit number
10901852 (Continued)		F	Blank
		G	2
		H	506
		Bulkhead disconnect connector	
		A	1
		B	478
		C	Blank
10901853	Circuit breaker-to-bulkhead disconnect branched wiring harness	Bulkhead connector	
		A	37A
		B	15 & 25
		C	27
		D	459
		E	506
		F	Blank
		G	317
		H	317A
10901855	Floor disconnect-to-bulkhead disconnect wiring harness	Floor connector	
		A	317A
		B	28
		Bulkhead connector	
		A	317A
		B	28
10901856	Bulkhead disconnect-to-magnetic clutch lead	Bulkhead connector	
		A	317A
		B	28
		Magnetic clutch connector	
		A	317A
		B	Ground
10901859	Battery positive-to-battery negative lead		
10901860	Battery negative-to-ground lead		7
10908425	Hull disconnect, interphone amplifier-to-bulkhead disconnect and driver's control box wiring harness		To match communications equipment
		A	
		B	
		C	
		D	
		E	
		F	
		G	
		H	
		I	
		J	
		K	
		L	
		M	
		N	
		P	
10914680	Bulkhead disconnect-to-instrument panel switches wiring harness	A	37A
		B	15 & 25
		C	27
		D	459
		E	506
		F	Blank
		G	317
		H	317A
10914828	Blower-to-ground lead		Ground
10914937	Generator-to-ground lead		3
10919885	Horn-to-warning relay wiring harness	Warning relay connector	
		A	506
		B	509H
		C	509

Table 11-2. Wiring Harness Intraconnection List — Continued

Harness or lead number	Description	Pin number	Circuit number
10919889	Generator control circuits-to-bracket disconnect wiring harness	Bracket connector	
		A	478
		B	1
		C	14D, 415
10919944	Bulkhead disconnect-to-driver's controls wiring harness	Bulkhead disconnect	
		A	76
		B	480
		C	415
		D	Blank
		E	14
		F	478
		H	1
		J	321
		K	324
		L	33
		M	36
		N	509
10919944		Gages and lights disconnect	
		A	Ground
		E	36
		D	33
		C	324
		B	321
		M	519A
		N	519
		F	27
		H	28
		J	509
		K	459
		L	506
10919945	Engine warning lights circuits-to-bulkhead disconnect wiring harness	Bulkhead disconnect	
		A	76
		B	480
		C	415
		D	Blank
		E	14
		F	478
		H	1
		J	321
		K	324
		L	33
		M	36
		N	509
10934867	Disconnect-to-forward air cleaner blower motor lead		345
11592728	Lighting switch-to-vehicle accessories and disconnect wiring harness	Lighting switch connector	
		A	75
		B	40
		C	22
		D	520
		E	20, 24
		F	15, 25
		H	21
		J	Blank
		K	75
		L	Blank
		M	16
		N	23
		Dimmer switch connector	
		A	515
		B	514
		C	514, 515

Table 11-2. Wiring Harness Intraconnection List — Continued

Harness or lead number	Description	Pin number	Circuit number
11592728 (Continued)		D	519A
		E	18
		F	17
		G	16
11592728		Taillights connector	
		A	Blank
		B	28
		C	21
		D	22
		E	23
		F	24
		G	345
		H	234
		Right headlight and horn connector	
		A	Blank
		B	18
		C	17
		D	20, 24
		E	19
		F	514
		G	515
		H	25
11592729	Master relay-to-bulkhead disconnect lead ("A" vehicles)		81
11592730	Battery-to-bulkhead disconnect lead		81
11592731	Bulkhead-to-bulkhead starter circuit lead		10, 81, 82
11592733	Bulkhead disconnect-to-trailer receptacle disconnect and taillights wiring harness	Bulkhead disconnect	
		A	Blank
		B	28
		C	21
		D	22
		E	23
		F	24
		G	345
		H	234
		Turret disconnect	
		A	317
		B	37A
		C	234
11592734	Voltage regulator to master relay and accessories cable assembly ("A" vehicles)	Starter bulkhead connector	82
11592734		Trailer receptacle voltage regulator connector	49,50
		A	Blank
		B	950
		C	Blank
		D	950
		E	Blank
		F	Blank
		G	5
		H	Blank
		Circuit breakers	10
		Oil gear motor connector	155
11592755	Disconnect-to-headlamp wiring harness	Headlamp connector	
		A	18
		B	17
		C	91
		D	515
		E	514
		F	20
		G	19
		H	Blank

Table 11-2. Wiring Harness Intraconnection List — Continued

Harness or lead number	Description	Pin number	Circuit number
11631547	Aeration detector diode assembly ("B" vehicles)		459
11643129	Relay-to-starter and neutral position switch wiring harness	Relay connector	
		A	14A
		B	14B
		C	14C
		D	14D
11675547	Fuel purge and prime switch-to-solenoid lead ("B" vehicles)		480A
11675566	Warning light low coolant detector-to-bulkhead disconnect ("B" Vehicles)		509B, 509C, Ground
11675567	Aeration detector connector assembly ("B" Vehicles)		509,509B
11675568	Low coolant warning light-to-bulkhead disconnect wiring harness ("B" vehicles)	Aeration detector warning light connector	
		A	509A
		B	509B
		C	509C
		Domelight	38
11675625	Master relay-to-bulkhead disconnect lead ("B" Vehicles)		81
11675638	Voltage regulator-to-master relay and accessories cable assembly ("B" vehicles)	Starter bulkhead connector	82
		Trailer receptacle	49, 50
		Voltage regulator connector	
		A	Blank
		B	Blank
		C	Blank
		D	Blank
		E	Blank
		F	Blank
		G	5
		H	Blank
		Circuit Breakers	10
		Oil gear motor connector	155

CHAPTER 12
HULL HYDRAULIC COMPONENTS REPAIR

Section I. DESCRIPTION AND DATA

12-1. Description and Operation

The hull hydraulic system is comprised of the lockout cylinders, tubes, fittings, and components; and the spade hydraulic system. Hydraulic pressure for the hull hydraulic system is provided by a rotary gear pump mounted on a carrier bearing unit that in turn is connected to the hydraulic pump drive shaft and magnetic clutch. The spade hydraulic system relief valve provides against overpressurization of the spade hydraulic system. For information on repair of lockout cylinders refer to Chapter 14. For information on repair of spade cylinder refer to Chapter 13.

12-2. Data

Rotary Pump:	
Military number	10906747
Rated output pressure	2,000 psi
Rated flow at 2,000 psi	23.5 gpm
Quick-Disconnect Coupling:	
Military number	MS24334-20

Section II. ROTARY PUMP REPAIR

12-3. General

This section provides instructions for disassembly, cleaning, inspection, repair and assembly of the rotary pump.

12-4. Rotary Pump Repair

(Fig. 12-1)

a. *Disassembly.*

(1) Clean outside of pump thoroughly before disassembly.

(2) Use scribe, or sharp tool, and match mark across front plate, body, and back plate.

CAUTION

At assembly make sure match marks are alined.

(3) Clamp pump in vise, shaft down, and remove eight tie bolts.

(4) Remove pump from vise, hold pump in hands and bump drive shaft against wooden block to separate front plate from body and back plate. Body will remain with back plate.

(5) Remove drive gear and idler gear assemblies from body.

(6) Place drive gear shaft into bearing in body and tap protruding end of drive shaft with soft face hammer to separate body from back plate and thrust plate.

(7) Remove thrust plate from back plate and discard thrust plate.

(8) Remove and discard preformed packing (2 places) from body (if installed).

NOTE

Older model pumps do not have preformed packing installed in body.

(9) Pry diaphragm from front plate and discard diaphragm.

(10) Lift springs (2 places) and balls (2 places) from front plate, discard springs and balls.

(11) Lift nylatron gasket and protector gasket from front plate and discard gaskets.

(12) Remove and discard moulded V-seal from front plate.

(13) Remove and discard shaft seal from front plate.

b. *Cleaning.*

(1) Clean parts with dry-cleaning solvent (SD-2).

(2) Dry parts with clean, dry, low pressure air.

(3) Lightly coat all machines surfaces with lubrication oil (OE/HDO) to prevent corrosion.

c. *Inspection.*

(1) Inspect gears for burrs, scratches, broken teeth or cracks.

(2) Inspect all threads for damage.

(3) Inspect all parts for burrs, cracks or corrosion.

d. *Repair.*

(1) Repair damaged threads with die or thread chaser.

(2) Remove minor nicks, scratches and/or burrs with fine hone or crocus cloth.

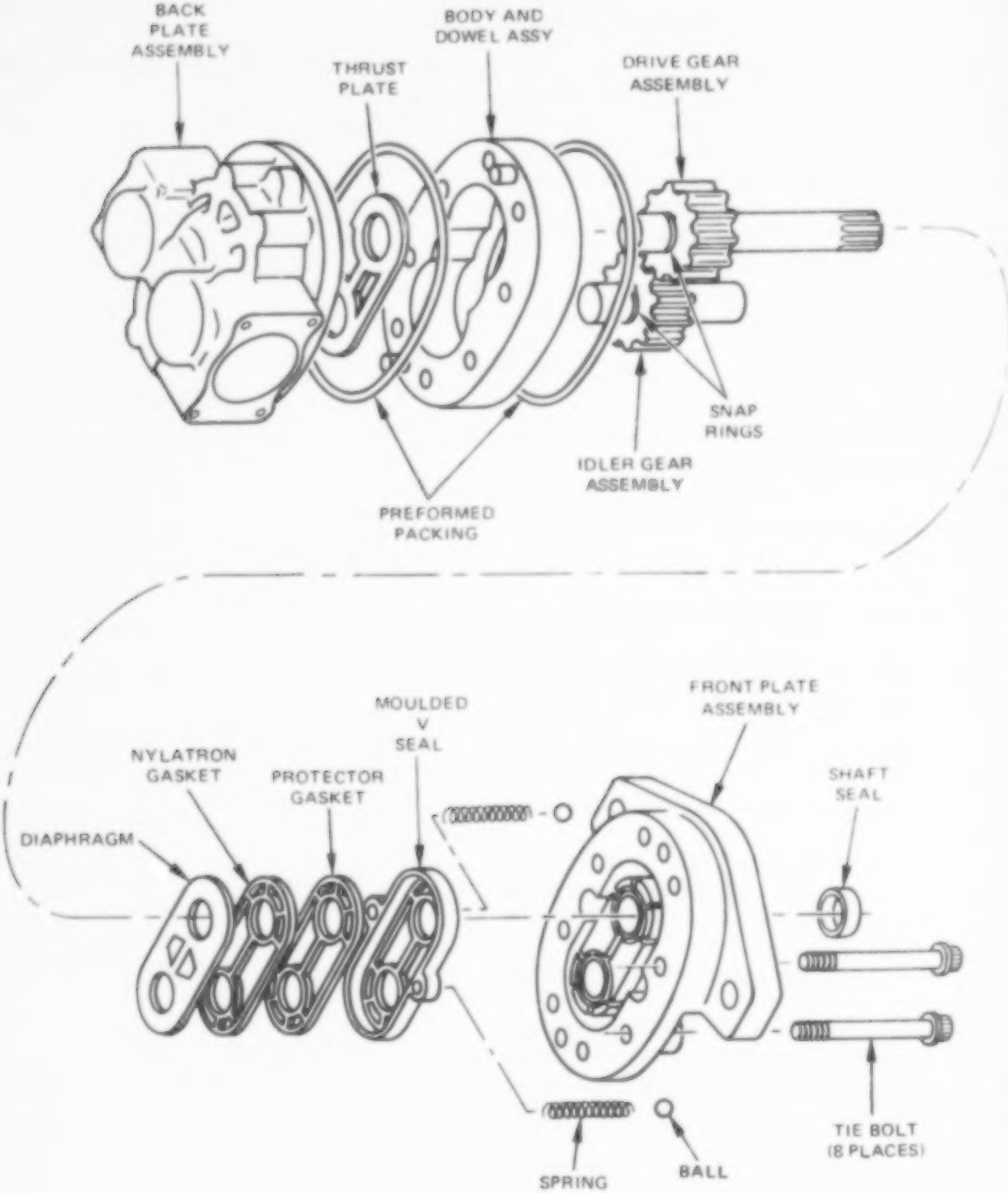
(3) Repair beyond the above is limited to installation of repair kit (5704448) consisting of the following parts.

(*a*) Thrust plate
(*b*) Diaphragm
(*c*) Nylatron gasket
(*d*) Protector gasket
(*e*) Moulded V-seal
(*f*) Springs (2)
(*g*) Steel balls (2)
(*h*) Shaft seal
(*i*) Preformed packings (2).

e. *Assembly.*

(1) Lubricate all seals, gaskets and packing with lubricating oil (OE/HDO) before installation to facilitate assembly.

(2) Assemble rotary pump in the reverse order of disassembly.


BACK PLATE ASSEMBLY
THRUST PLATE
BODY AND DOWEL ASSY
DRIVE GEAR ASSEMBLY
SNAP RINGS
IDLER GEAR ASSEMBLY
PREFORMED PACKING
MOULDED V SEAL
FRONT PLATE ASSEMBLY
NYLATRON GASKET
PROTECTOR GASKET
SHAFT SEAL
DIAPHRAGM
TIE BOLT (8 PLACES)
SPRING
BALL

TA 011810

Figure 12-1. Rotary pump disassembly or assembly.

Section III. ROTARY PUMP REPAIR STANDARDS

12-5. General

Repair standards for the rotary pump are listed in table 12-1 and illustrated on figure 12-2. The reference letters on the illustration are shown in the second column of the table. Each item in the table indicates the point of measurement or inspection, part name, size and fit of new part, wear limits, and code symbols to coordinate information. Wear limits indicate that point to which a part or parts may be worn before replacement in order to obtain maximum service with minimum replacement. Clean grease from surfaces and wet mating surfaces with sealing compound Grade B, specification MIL-S-22473.

Table 12-1. Rotary Pump Repair Standards

Fig no.	Ref letter	Point of measurement	Size and fit of new parts	Wear limits
12-2	A	Spline on drive shaft: measurement over 0.1080 pins	0.9508 to 0.9526	0.9478

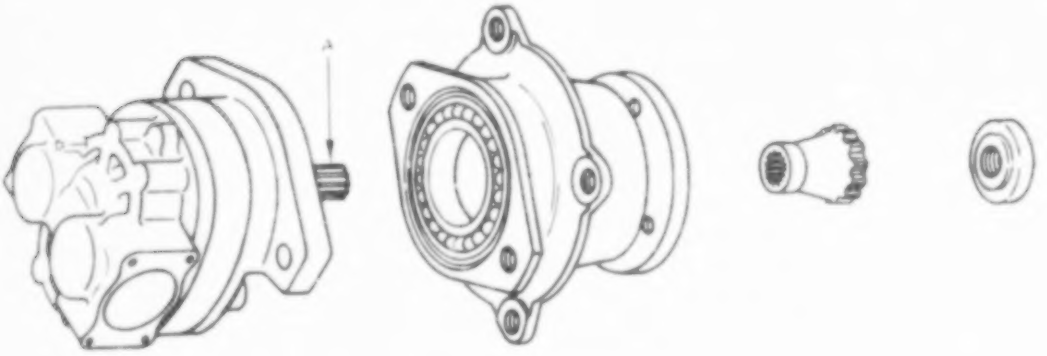


Figure 12-2. Rotary pump measurement and inspection points.

Section IV. QUICK DISCONNECT COUPLING REPAIR

12-6. General

This section provides instructions for disassembly, cleaning, inspection, repair and assembly of the quick disconnect coupling (MS24334).

12-7. Quick Disconnect Coupling Repair (MS24334)

The procedures described in *a*, *b*, *c*, and *e* below are typical for the different sizes of quick disconnect couplings (MS24334).

a. Disassembly (fig. 12-3).

(1) Secure hose in vise and unscrew coupling from hose fitting.

(2) Rotate coupling half sleeve until slot is alined with pin and pull sleeve back over pin and separate coupler halves.

(3) Secure nipple of male coupler half in vise and unscrew adapter from nipple.

(4) Remove valve stop, valve spring and valve from adapter.

(5) Remove O-ring from nipple and adapter, discarding O-rings.

(6) Secure nipple of female coupler half in vise and unscrew adapter from nipple.

(7) Remove valve stop, valve spring and valve from nipple.

(8) Remove O-rings from adapter and nipple, discard O-rings.

(9) Remove nipple from vise and remove and discard packer or ring seal and backup ring from nipple.

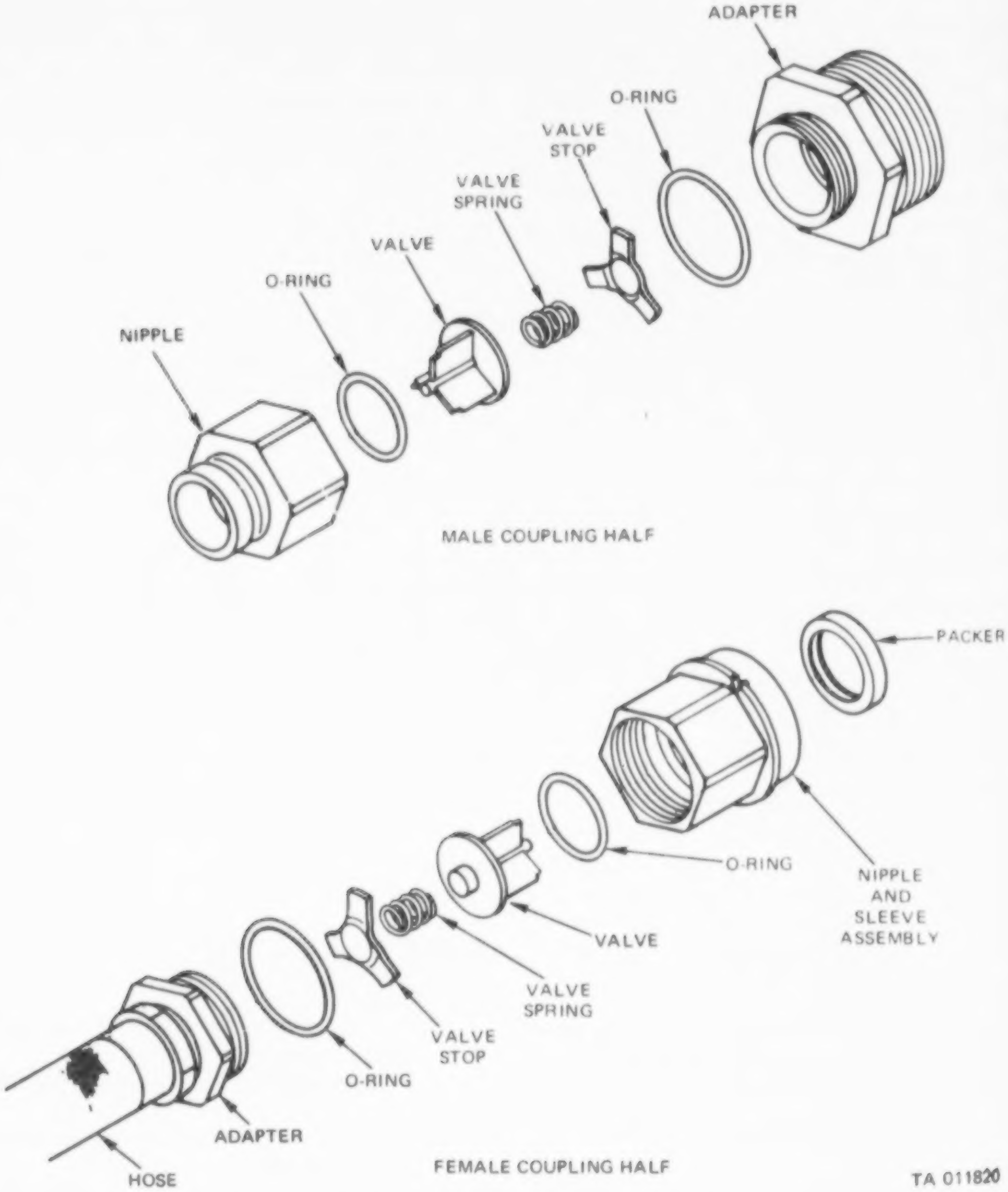

ADAPTER
O-RING
VALVE STOP
VALVE SPRING
VALVE
O-RING
NIPPLE
MALE COUPLING HALF
PACKER
O-RING
NIPPLE AND SLEEVE ASSEMBLY
VALVE
VALVE SPRING
VALVE STOP
O-RING
ADAPTER
HOSE
FEMALE COUPLING HALF
TA 011820

Figure 12-3. Hydraulic quick disconnect coupling disassembly or assembly.

b. Cleaning. Clean all parts with dry-cleaning solvent (SD-2). Dry with low pressure air and lightly coat all parts with lubricating oil (OEA) to prevent corrosion.

c. Inspection. Inspect parts for corrosion, distortion, and damaged threaded areas.

d. Repair. Repair of quick disconnect couplings consists of installation of the proper repair kit. Use repair kit 5704456 for coupling MS24334-6. Use repair kit 5704457 for coupling MS24334-8. Use repair kit 5704458 for coupling MS24334-10. Use repair kit 5704453 for coupling MS24334-20.

e. Assembly (fig. 12-3). Assemble, installing proper repair kit, in the reverse order of disassembly (*a* above).

CHAPTER 13
SPADE CYLINDER REPAIR

Section I. DESCRIPTION AND DATA

13-1. Description and Operation

Two double acting hydraulic spade cylinders are mounted to the spade and hull to provide lifting and lowering capability to the spade. Valving to apply pressure to one side of the piston and to release hydraulic pressure on the other side of the piston to raise or lower the spade is accomplished by the spade control valve located at the left rear of the hull.

13-2. Data

Spade Cylinder:

Military number	10891960
Extended length	65.50 inches
Retracted length	29.25 inches
Stroke	26.25 inches

Section II. SPADE CYLINDER REPAIR

13-3. General

This section provides information for the disassembly, cleaning, inspection, repair and assembly of the spade cylinder. The spade cylinder can usually be repaired with the components in repair kit (5703293). If cylinder shell, piston rod or lift control tube are damaged or unserviceable, replace entire cylinder.

13-4. Spade Cylinder Repair

(Fig. 13-1)

a. *Disassembly.*

(1) Remove two bleeder plugs and preformed packings located at either end of cylinder, and drain hydraulic fluid from cylinder. Discard packing.

(2) Loosen nut securing detent in cylinder lock and remove nut and detent.

NOTE

At assembly, install detent through cylinder lock to extend beyond surface 0.12 - 0.09 inch and torque nut to 6-8 lb ft.

(3) Pull piston partially from cylinder and unscrew cylinder lock from cylinder shell and place lock over piston rod eye.

(4) Remove and discard setscrew from head locknut.

(5) Remove cylinder head locknut from shell using spanner wrench (NSN 5120-00-860-9578) (A, fig. 13-2).

(6) Pull piston rod assembly from cylinder sheel until it contacts the cylinder head.

(7) Tap on flats of piston rod eye using a brass rod and hammer to loosen the cylinder head (B, fig. 13-2), and pull piston rod assembly and cylinder head from cylinder shell.

CAUTION

Do not scratch or otherwise damage surface of piston rod.

(8) Slide cylinder head and cylinder lock down on piston rod away from eye. Secure piston rod assembly in a clean, soft-jawed vise.

(9) Remove two lubrication fittings and setscrew from piston rod eye.

NOTE

After installation of eye on piston rod, tighten setscrew securely to lock eye in place.

(10) Remove eye from piston rod. Use strap wrench to hold piston rod from turning in vise. Use smooth jawed wrench or improvised tool on flats of rod eye to unscrew eye from piston rod. Pull eye and lift control tube from piston rod.

NOTE

At assembly, torque rod eye to 600 ± 20 lb ft.

(11) Loosen nut and unscrew lift control tube from eye. Remove and discard leather backup washers and preformed packing.

(12) Remove cylinder lock and cylinder head from piston rod.

NOTE

At installation of cylinder head onto piston rod, first install spade cylinder rod packing protector (11675660) into piston rod, then install cylinder head over protector onto rod. Remove protector from rod.

(13) Remove and discard preformed packing and seal from inside of cylinder head. Remove and discard preformed packing from circumference of cylinder head.

NOTE

At installation, install seal in cylinder head with replacer (NSN 5120-00-722-4089) (C, fig. 13-2).

(14) Unscrew piston and rod plug from center of piston rod. Remove and discard preformed packings from inside and outside of plug.

(15) Remove and discard three piston seals from piston rod.

(16) Press bearings from rod eye and from cylinder shell with bearing replacer (NSN 5120-00-733-8979) (D, fig. 13-2).

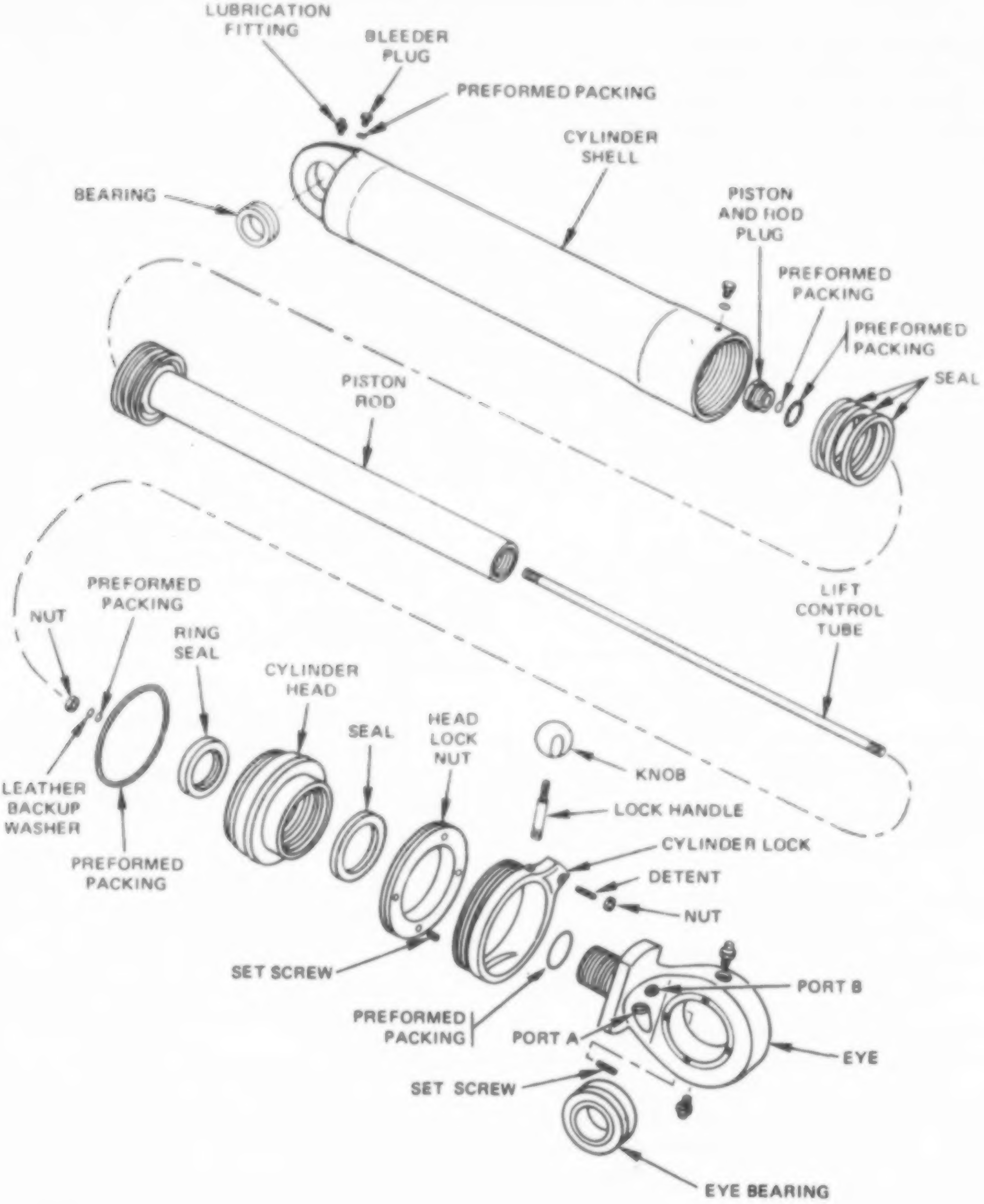
NOTE

Both sides of each bearing are staked in place at assembly.

(17) If damaged, remove knob and lock handle from cylinder lock.

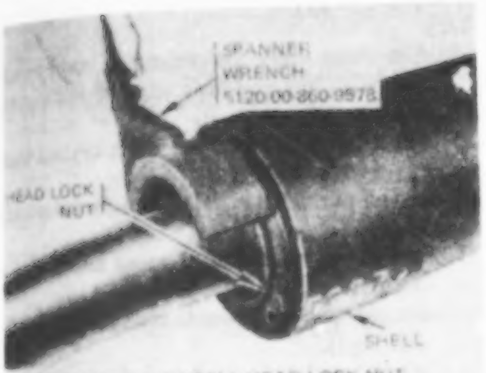
NOTE

At assembly, apply sealing compound C or CV to handle threads.

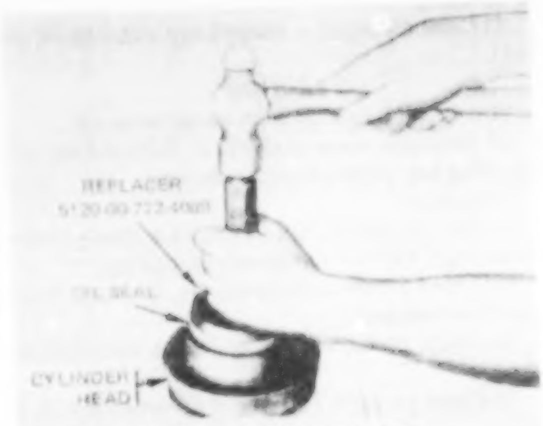

LUBRICATION FITTING
BLEEDER PLUG
PREFORMED PACKING
CYLINDER SHELL
BEARING
PISTON AND ROD PLUG
PREFORMED PACKING
PREFORMED PACKING
SEAL
PISTON ROD
LIFT CONTROL TUBE
NUT
PREFORMED PACKING
RING SEAL
CYLINDER HEAD
SEAL
HEAD LOCK NUT
KNOB
LOCK HANDLE
CYLINDER LOCK
DETENT
NUT
LEATHER BACKUP WASHER
PREFORMED PACKING
SET SCREW
PORT B
PREFORMED PACKING
PORT A
EYE
SET SCREW
EYE BEARING

TA 011821

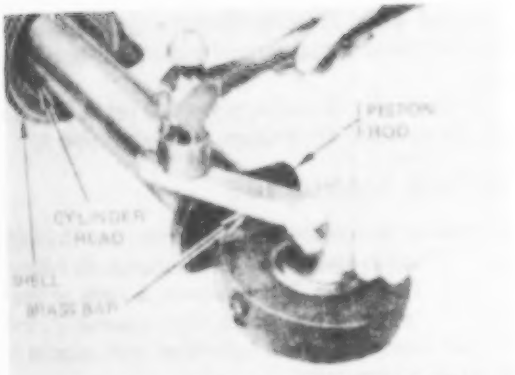
Figure 13-1. Spade cylinder disassembly or assembly.


SPANNER
WRENCH
5120-00-860-9978
HEAD LOCK
NUT
SHELL

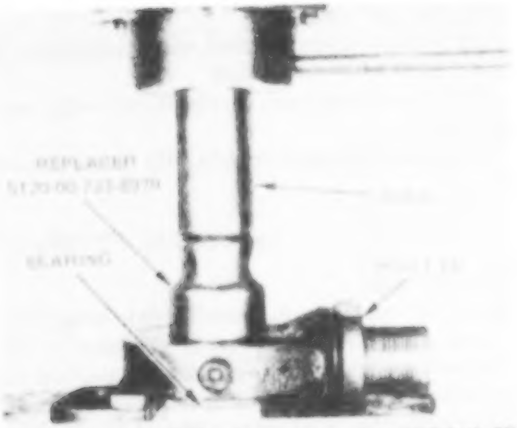
A. REMOVE OR INSTALL HEAD LOCK NUT


REPLACER
5120-00-772-4000
OIL SEAL
CYLINDER
HEAD

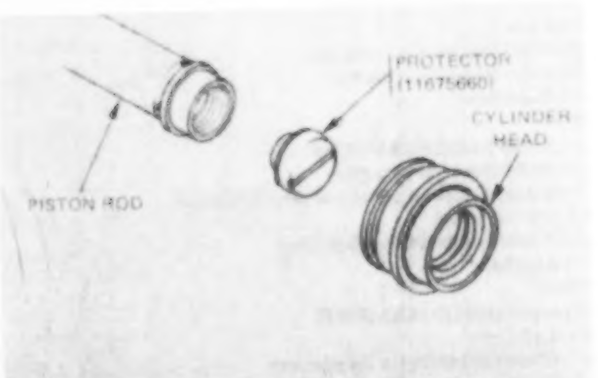
C. INSTALL SEAL IN CYLINDER HEAD


PISTON
ROD
CYLINDER
HEAD
SHELL
BRASS BAR

B. LOOSEN CYLINDER HEAD FROM CYLINDER SHELL


REPLACER
5120-00-723-6979
BEARING
ROD EYE

D. REMOVE OR INSTALL BEARING IN ROD EYE OR CYLINDER SHELL EYE


PROTECTOR
(11675660)
CYLINDER
HEAD
PISTON ROD

E. INSTALL PROTECTOR IN ROD AND INSTALL PISTON HEAD ON PISTON ROD.

TA 011672

Figure 13-2. Spade cylinder special tools for disassembly or assembly.

b. Cleaning.

(1) Clean all metal parts with dry-cleaning solvent (SD-2).

CAUTION

Do not spin bearings with compressed air.

(2) Carefully remove solvent or thinner from each part, using low pressure compressed air.

c. Inspection.

(1) Check cylinder shell for cracks or dents. Inspect interior shell wall for corrosion and pitting.

(2) Check all threaded areas for damage, crossed threads and burrs.

(3) Check piston rod for scratches, corrosion and pitting.

(4) Check all parts for wear in accordance with table 13-1.

(5) Inspect bearings as prescribed in TM 9-214.

d. Repair.

(1) Replace spade cylinder if shell, piston rod or lift control tube are damaged.

(2) Remove corrosion and minor scratches from cylinder shell with crocus cloth.

(3) Remove scratches on piston rod with hone or crocus cloth.

(4) Repair damaged threads with thread chaser or die.

(5) Replace all parts with components in repair kit (5703293).

(6) Dress stake mark distortions on rod eye and shell eye bores with fine mill file and polish with crocus cloth.

(7) Replace all parts that are worn beyond the limits specified in table 13-1.

(8) Clean all part after repair and before assembly.

e. Assembly.

(1) Lightly coat all threaded areas and inside of cylinder shell with oil (OE/HDO).

(2) Assemble spade cylinder in reverse order of disassembly (fig. 13-1).

(3) If paint has deteriorated or is damaged, clean and repaint after assembly. Do not paint piston rod or bearings.

f. Hydrostatic Test.

(1) Fill space cylinder with hydraulic fluid (OHT) specification MIL-H-6083 filtered through a 10 micron filter. Push piston into cylinder shell.

(2) Apply 4,000 psi hydraulic pressure to both eye ports A and B (fig. 13-1) for five minutes. No leakage is allowed at bleed ports, around piston rod or cylinder head.

(3) Open port A and apply 4,000 psi at port B to check piston seals. No leakage allowed at port A.

Section III. SPADE CYLINDER REPAIR STANDARDS

13-5. General

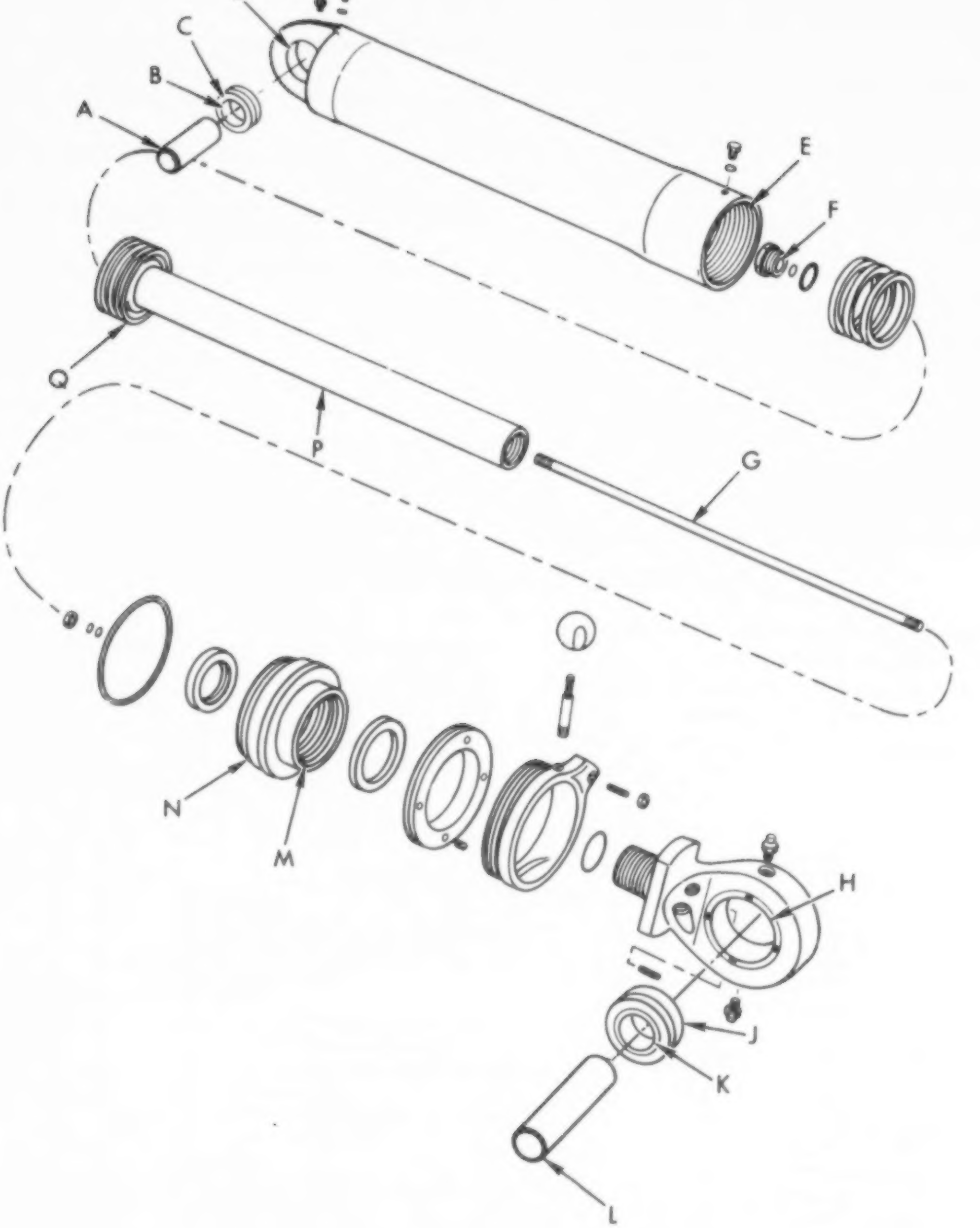
Figure 13-3 and table 13-1 detail repair standards for the spade cylinder. The reference numbers on the illustration are shown in the second column of the table. Each item in the table indicates the point of measurement or inspection, part name, size and fit of new part, wear limits for direct and general support units, and code symbols to coordinate the information. The suffix letter "L" indicates a loose or clearance fit between two parts. The letter "T" indicates a tight or interference fit between two parts. The asterisk (*) indicates that tolerances on an individual part must be the same as on a new part.

Table 13-1. Spade Cylinder Repair Standards

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
13-3	H	ID of rod eye	3.1875 to 3.1880	3.1900
13-3	J	OD of self-alining bearing in rod eye	3.1867 to 3.1875	*
13-3	H-J	Fit of rod eye ID to OD of bearing	0.0000 to 0.0013L	0.0033L
13-3	M	ID of cylinder head	3.0000 to 3.0030	*
13-3	P	OD of rod	2.9960 to 2.9980	2.9910
13-3	M-P	Fit of cylinder head ID to OD of rod	0.0020L to 0.0070L	0.0120L
13-3	N	OD of cylinder head (stationary)	5.9980 to 5.9990	*
13-3	G	OD of lift control tube at piston rod plug fitting end	0.7460 to 0.7490	*
13-3	F	ID of piston rod plug	0.7500 to 0.7530	*
13-3	F-G	Fit of lift control tube OD to ID of plug	0.0010L to 0.0070L	*
13-3	Q	OD of piston head lands	5.9970 to 5.9990	*
13-3	E	ID of shell	6.0010 to 6.0040	6.0090
13-3	Q-E	Fit of piston lands OD to ID of shell	0.0020L to 0.0070L	0.0120L
13-3	D	ID of cylinder eye	3.1875 to 3.1880	3.1900
13-3	C	OD of self-alining bearing in cylinder eye	3.1867 to 3.1875	*
13-3	D-C	Fit of cylinder eye ID to OD of bearing	0.0000 to 0.0013L	0.0033L
13-3	B	ID of self-alining bearing in cylinder eye	1.9995 to 2.0015	*
13-3	A	OD of spade cylinder pin	1.9960 to 1.9990	1.9885
13-3	B-A	Fit of bearing ID to OD of spade cylinder pin	0.0005 to 0.0055L	0.0130
13-3	K	ID of self-alining bearing in rod eye	1.9995 to 2.0015	*
13-3	L	OD of spade cylinder pin	1.9960 to 1.9990	1.9885

Table 13-1. Spade Cylinder Repair Standards — Continued

Fig. no.	Ref letter	Point of measurement	Size and fit of new parts	Wear limits
13-3	K-L	Fit of bearing ID to OD of spade cylinder pin	0.0005L to 0.0055L	0.0130
13-3	.....	ID of spade cylinder anchor on hull, left hand and right hand	2.0010 to 2.0040	2.0090
13-3	.....	Fit of spade cylinder anchor ID to OD of spade cylinder pin	0.0020L to 0.0080L	0.0205L
13-3	.....	ID of spade cylinder anchor on spade, left hand and right hand	2.0010 to 2.0040	2.0090
13-3	.....	Fit of spade cylinder anchor ID to OD of spade cylinder pin	0.0020L to 0.0080L	0.0205L


D
C
B
A
E
F
Q
P
G
N
M
H
J
K
L

TA 011823

Figure 13-3. Spade cylinder measurement and inspection points.

CHAPTER 14
LOCKOUT CYLINDER REPAIR

Section I. DESCRIPTION AND DATA

14-1. Description

NOTE

M107 vehicle serial numbers 1 through 296, M110/M110A1 vehicles serial numbers 1 through 412 and M110A1 vehicles serial numbers 1-1 through 296-1 were initially equipped with ten lockout cylinders. M107 vehicles serial numbers 297 and on, M110/M110A1 vehicle serial numbers 413 and on and M110A1 vehicle serial numbers 297-1 and on are equipped with eight lockout cylinders.

Eight lockout cylinders, part of the vehicle suspension system, are linked to the roadwheel and trailing idler arm and hub assemblies. During vehicle operation the lockout cylinders operate as shock absorbers. When hydraulically locked out, the lockout cylinders prevent movement of the arm and hub assemblies holding the vehicle wheels and hull rigid, thus providing a stable firing platform. Each lockout cylinder is connected to an arm and hub assembly by a control lever. When each roadwheel moves up, the control lever forces the respective cylinder to compress. Hydraulic fluid is forced past the piston head through restrictor ports causing the cylinder to act as a shock absorber. When hydraulic pressure is applied to the inlet port on each cylinder connecting eye, an inner control valve piston is forced against a spring in each cylinder. This action closes the restrictor ports, blocks main piston motion in each cylinder, and locks the suspension.

14-2. Data

National stock number	2530-00-019-0010
Military number	10891574
Extended length	34.470 ± 0.125 in.
Compressed length	25.937 ± 0.063 in.
Weight	80 lb.

Section II. LOCKOUT CYLINDER REPAIR

14-3. General

This section contains instructions for disassembly, cleaning, inspection, repair and reassembly of the lockout cylinder. Repair of the lockout cylinder is allocated to general support maintenance personnel. Refer to paragraph 1-2.

14-4. Lockout Cylinder Disassembly

a. Cut lock wire and remove two bleeder plugs from cylinder shell. Remove and discard two preformed packings (A, fig. 14-1).

b. Drain hydraulic fluid from both bleeder ports and from control port located in rod eye (A, fig. 14-1).

c. Remove pipe plug and four socket head screws securing lock nut to cylinder head at rod eye end (B, fig. 14-1).

d. Remove lock nut from cylinder shell using spanner wrench (NSN 5120-00-733-8982) (C, fig. 14-1).

NOTE

The cylinder head is installed with sealing compound around outer edge.

e. Remove rod eye, lock nut, cylinder head and cylinder rod from cylincer shell (D, fig. 14-1).

f. Remove pipe plug and four socket head screws from adapter end of cylinder (E, fig. 14-1).

g. Unscrew adapter from cylinder shell (F, fig. 14-1).

NOTE

The adapter is installed with sealing compound around outer edge.

h. Remove cylinder head from adapter end of cylinder shell. Remove and discard cylinder head seal, outer packing retainer, outer preformed packing and inner preformed packing (G and N, fig. 14-1).

i. Remove set screw securing cylinder rod eye to cylinder rod (H, fig. 14-1), only if rod eye is to be replaced.

NOTE

Set screw is installed with sealing compound and staked.

WARNING

Use caution when removing rod eye as spring pressure exists behind the eye.

j. Remove rod eye from cylinder rod using suitable spanner wrench, improvised adapter (see fig 2-2) and 1¼ hex socket wrench (K, fig. 14-1).

NOTE

Rod eye is installed and tightened to 300 to 400 lb ft.

k. Remove spacer, lock nut and cylinder head from cylinder rod (L, fig. 14-1).

l. Remove and discard cylinder rod seal from cylinder rod and preformed packing from rod eye end (L, fig. 14-1).

m. Remove and discard rod eye cylinder head seal, outer packing retainer, outer preformed packing and inner preformed packing (G and N, fig. 14-1).

n. Remove retaining ring, vent and washer from cylinder rod (O, fig. 14-1).

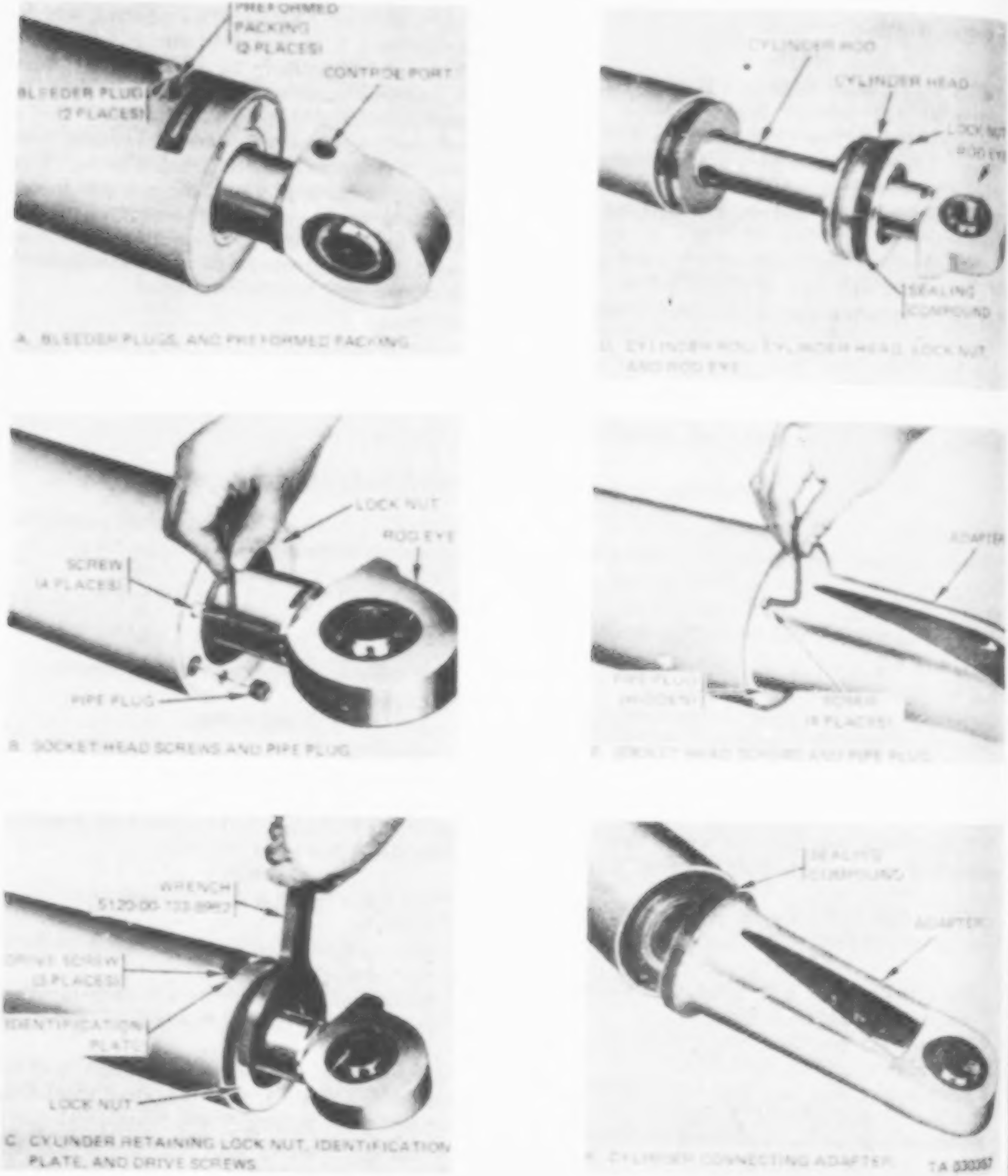
o. Pull control valve piston and piston return spring through threaded end of cylinder rod. Remove and discard four packings from piston (P, fig. 14-1).

p. Press bearings out of rod eye and adapter with a press and suitable block (Q, fig. 14-1).

NOTE

Bearings are staked in place at assembly.

q. If identification plate removal is necessary, cut of heads of three drive screws with sharp chisel an remove plate (C, fig. 14-1).


PREFORMED PACKING (2 PLACES)
BLEEDER PLUG (2 PLACES)
CONTROL PORT
CYLINDER ROD
CYLINDER HEAD
LOCK NUT
ROD EYE
SEALING COMPOUND
LOCK NUT
ROD EYE
SCREW (4 PLACES)
PIPE PLUG
ADAPTER
SCREW (4 PLACES)
WRENCH 5120-00-133-8983
DRIVE SCREW (3 PLACES)
IDENTIFICATION PLATE
LOCK NUT
SEALING COMPOUND
ADAPTER
TA 030367

A. BLEEDER PLUGS, AND PREFORMED PACKING

D. CYLINDER ROD, CYLINDER HEAD, LOCK NUT AND ROD EYE

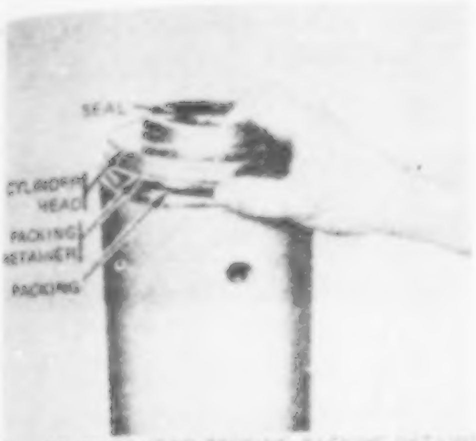
B. SOCKET HEAD SCREWS AND PIPE PLUG

E. SOCKET HEAD SCREWS AND PIPE PLUG

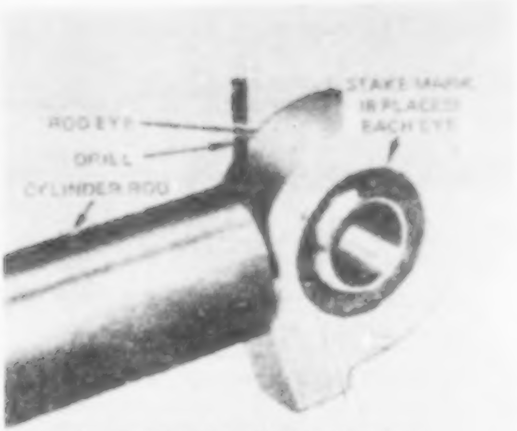
C. CYLINDER RETAINING LOCK NUT, IDENTIFICATION PLATE, AND DRIVE SCREWS

F. CYLINDER CONNECTING ADAPTER

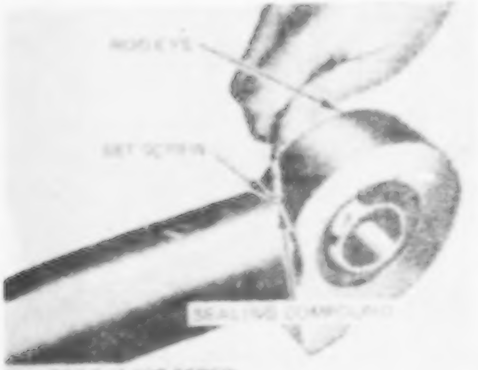
Figure 14-1. Lockout cylinder disassembly or assembly (sheet 1 of 3).


SEAL
CYLINDER HEAD
PACKING RETAINER
PACKING

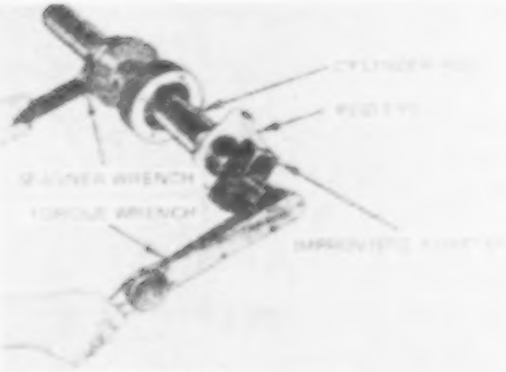
G. CYLINDER HEAD, PACKING, PACKING RETAINER AND OUTER ROD SEAL.


STAKE MARK (8 PLACES) EACH EYE
ROD EYE
DRILL
CYLINDER ROD

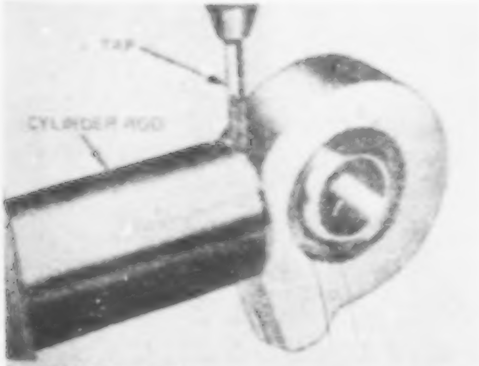
H. SET SCREW HOLE AND STAKE MARKS.


ROD EYE
SET SCREW
SEALING COMPOUND

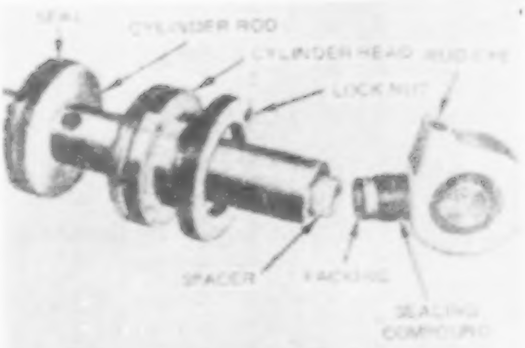
I. ROD EYE SET SCREW.


CYLINDER ROD
ROD EYE
SPANNER WRENCH
TORQUE WRENCH
IMPROVISED ADAPTER

K. CYLINDER ROD EYE.

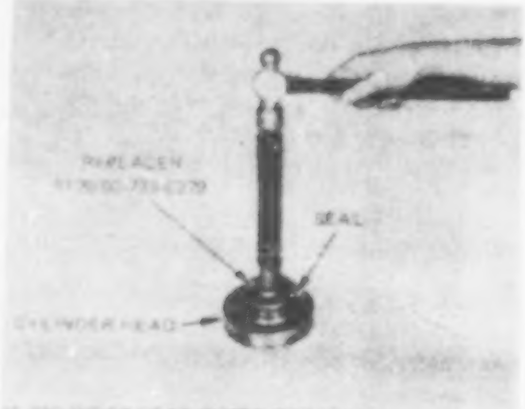

TAP
CYLINDER ROD

J. SET SCREW HOLE.

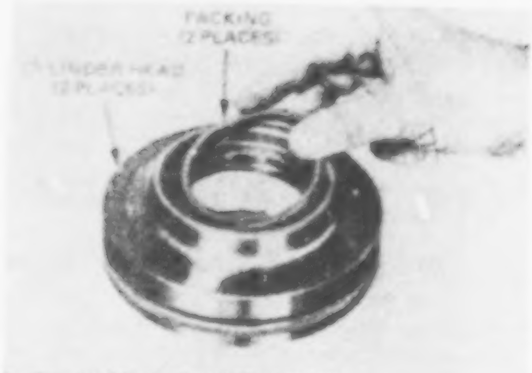

SEAL
CYLINDER ROD
CYLINDER HEAD
ROD EYE
LOCK NUT
SPACER
PACKING
SEALING COMPOUND

L. CYLINDER HEAD, LOCK NUT, ROD EYE, SEAL, SPACER AND PACKING.

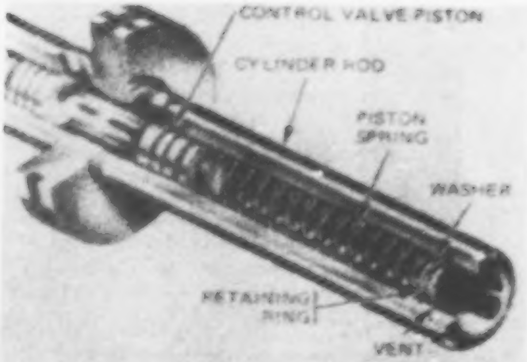
Figure 14-1. Lockout cylinder disassembly or assembly (sheet 2 of 3).


REPLACER
4120-00-733-0279
SEAL
CYLINDER HEAD

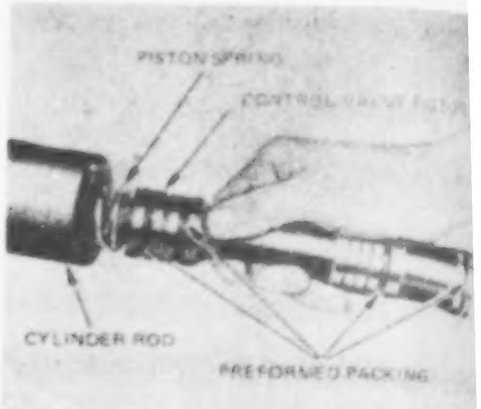
M. CYLINDER HEAD OUTER ROD SEAL.


PACKING
(2 PLACES)
CYLINDER HEAD
(2 PLACES)

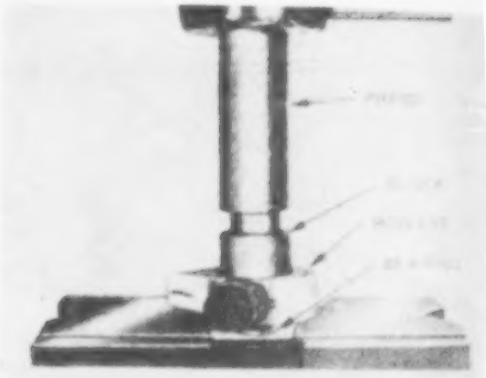
N. CYLINDER HEAD INNER PACKING.


CONTROL VALVE PISTON
CYLINDER ROD
PISTON
SPRING
WASHER
RETAINING
RING
VENT

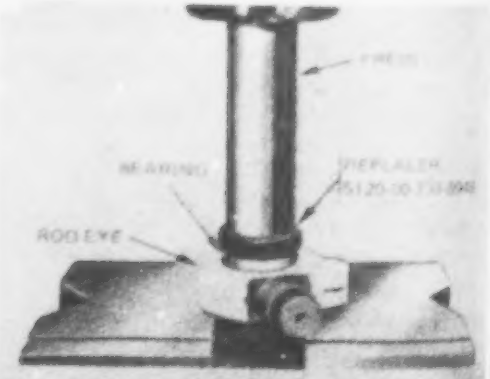
O. PISTON SPRING, WASHER, RETAINING RING, AND VENT.


PISTON SPRING
CONTROL VALVE PISTON
CYLINDER ROD
PREFORMED PACKING

P. PISTON RETURN SPRING, CONTROL VALVE PIS
AND PREFORMED PACKING


PRESS
BLOCK
ROD EYE
BEARING

Q. CYLINDER CONNECTING BEARING


PRESS
BEARING
REPLACER
4120-00-733-8918
ROD EYE

R. CYLINDER CONNECTING BEARING.

Figure 14-1. Lockout cylinder disassembly or assembly (sheet 3 of 3).

14-5. Cleaning

a. Clean all metal parts with dry-cleaning solvent (SD-2).

b. Remove sealing compound with alcohol.

c. Clean bearings in accordance with TM 9-214.

CAUTION

Do not spin bearings with compressed air.

d. Dry all parts with low pressure compressed air.

e. Remove rust or corrosion from bearing surfaces with solvent (SD-2), wire brush and crocus cloth.

f. Coat unpainted parts and mating surfaces with lubricating oil (OE-HDO) to prevent corrosion or rusting.

14-6. Inspection

a. Inspect all parts for physical damage, breaks, pits, cracks, scoring and for chipped or cracked paint.

b. Inspect bearings as prescribed in TM 9-214.

c. Inspect threaded areas for damage or crossed threads.

d. Inspect and measure parts for wear in accordance with repair standards table 14-1 and figure 14-2.

14-7. Repair

a. Replace lockout cylinder assembly if shell, adapter, rod eye or cylinder head is damaged or worn beyond wear limits in table 14-1.

b. Replace all seals and preformed packings.

c. Replace bearings that do not meet acceptance standards of TM 9-214.

d. Replace lubrication fittings if damaged.

e. Repair damaged threaded areas with thread chaser or dull die.

f. Dress stake mark distortions on rod eye and adapter bearing bores with fine mill file and polish with crocus cloth.

g. Replace identification plate if the information is illegible.

h. Replace defective non-repairable parts and parts worn beyond wear limits specified in repair standards table 14-1.

14-8. Lockout Cylinder Assembly

a. Install rod eye bearing in rod eye and adapter bearing in adapter using replacer (NSN 5120-00-733-8948) (R, fig. 14-1).

b. Stake bearings in four places on each side using a 0.31-inch diameter ball. Distorted metal must extend to bearing race (J, fig. 14-1).

c. Place cylinder rod on level, wooden V-block stand.

d. Slide piston spring into cylinder rod from retaining ring end until it is slightly past ring groove. Install washer and vent, with large diameter toward washer, into cylinder rod and secure with retaining ring (O, fig. 14-1).

e. Install four preformed packings in grooves on control valve piston (P, fig. 14-1).

CAUTION

Careless installation of control valve piston can result in damaged preformed packings.

f. Install control valve piston into threaded end opening of cylinder rod with small diameter of control valve piston facing in (O and P, fig. 14-1).

g. Install cylinder head inner preformed packing in both cylinder heads (N, fig. 14-1).

h. Install seal with lip facing out in both cylinder heads using replacer (NSN 5120-00-733-8929) (M, fig. 14-1).

i. Install outer preformed packing and packing retainer, with concave side facing packing, on both cylinder heads (G, fig. 14-1).

j. Install one cylinder head on rod eye end of cylinder rod with threaded holes facing rod eye (L, fig. 14-1).

k. Install lock nut on rod eye end of cylinder rod with large diameter of four holes facing rod eye (L, fig. 14-1).

l. Apply sealing compound specification MIL-S-22473 to threaded area of rod eye.

m. Install spacer into threaded end of cylinder rod (L, fig. 14-1).

n. Install packing on rod eye and place end of rod eye against spacer. Press against spacer and compress piston spring far enough to engage rod eye threads with cylinder rod (L, fig. 14-1).

o. Tighten rod eye to cylinder rod and torque to 300 to 400 lb ft. using spanner wrench, improvised adapter (fig. 2-2) and torque wrench (K, fig. 14-1).

p. Install seal on cylinder rod (L, fig. 14-1). Temporarily set assembled cylinder rod aside.

CAUTION

Careless installation of cylinder heads can result in damaged packings and seals.

q. Place cylinder shell on a firm level surface with bleeder plug ports facing up. Insert adapter-end cylinder head into shell so that threaded holes in cylinder head are facing out and two holes are 45 degrees left and right of bleeder port center line.

r. Turn cylinder shell up on end with adapter end against support surface.

s. Insert assembled cylinder rod into cylinder shell, making sure that rod is centered in shell.

t. Insert rod-eye-end cylinder head into cylinder shell to point where cylinder head packing is clear of cylinder shell threads. Place cylinder shell down with bleeder ports facing up.

u. Install bleeder plug without preformed packing into forward bleeder port adjacent to rod eye. Tighten plug finger tight (A, fig. 14-1).

v. Apply sealing compound specification MIL-S-22473 to lock nut threaded area (D, fig. 14-1).

w. Screw lock nut into cylinder shell until lock nut contacts cylinder head using wrench (NSN 5120-00-733-8982) (C, fig. 14-1).

x. Back off on lock nut until four screw access holes are in alinement with cylinder head threaded holes (C, fig. 14-1).

y. Apply sealing compound specification MIL-S-22473 to two of four socket head screws that secure cylinder head to lock nut.

z. Install two socket head screws 180 degrees apart through lock nut into cylinder head. If screws do not line up, apply sealing compound to pipe plug and expand lock nut by screwing pipe plug into nut sufficiently to allow screw insertion (B, fig. 14-1).

aa. Tighten two screws securing cylinder head and pull cylinder head into contact with lock nut (B, fig. 14-1).

ab. Screw lock nut and cylinder head into shell until cylinder head contacts inner protruding portion of bleeder plug using spanner wrench (NSN 5120-00-733-8982) (C, fig. 14-1).

ac. Back off on lock nut and cylinder head approximately 45 degrees and loosen two screws securing cylinder head to lock nut (B, fig. 14-1).

ad. Apply sealing compound specification MIL-S-22473 to two remaining cylinder head socket head screws and install screws through lock nut into cylinder head. Tighten screws finger tight.

ae. If pipe plug was not installed in paragraph *z* above, apply sealing compound specification MIL-S-22473 to pipe plug threaded area. Screw plug into lock nut and expand nut into cylinder shell internal threads. Tighten pipe plug to 40 lb ft minimum to 60 lb ft maximum torque (B, fig. 14-1). Pipe plug must not touch cylinder head. If pipe plug does touch cylinder head, remove plug and grind material from small diameter end of plug. Reinstall plug.

af. Check lock nut using spanner wrench (NSN 5120-00-733-8982) and torque wrench. Minimum loosening torque of lock nut within shell shall be 500 lb ft before sealing compound has set up and 650 lb ft after sealing compound has set up.

ag. Tighten four socket head screws and secure cylinder head to lock nut (B, fig. 14-1).

ah. Install bleeder plug without preformed packing into rear bleeder port adjacent to adapter. Tighten plug finger tight (A, fig. 14-1).

ai. Apply sealing compound specification MIL-S-22473 to adapter threaded area (F, fig. 14-1).

aj. Screw adapter into cylinder shell until cylinder head contacts inner protruding portion of bleeder plug (F, fig. 14-1).

CAUTION

Backing off on adapter more than 90 degrees will result in incorrect adjustment of adapter.

ak. Back of adapter until four screw access holes are in alinement with cylinder head threaded holes.

al. Apply sealing compound specification MIL-S-22473 to four socket head screws that secure adapter to cylinder head.

am. Insert four socket head screws through ada into cylinder head. If threaded holes in cylinder hea not line up, apply sealing compound specification M S-22473 to pipe plug threaded area and exp adapter by screwing pipe plug into adapter sufficien to allow screw insertion. Tighten screws finger ti (E, fig. 14-1).

CAUTION

Backing off on adapter more than 180 degrees can cause the cylinder rod piston to strike and break the rear bleeder plug.

an. Back off on adapter as required and locate pi plug 90 degrees left or right of bleeder plug ports.

ao. If pipe plug was not installed in paragraph an above, apply sealing compound specification MIL S-22473 to pipe plug threaded area and screw plug in adapter and expand adapter into cylinder shell internal threads. Tighten pipe plug to 40 lb ft maximum torque (E, fig. 14-1). Pipe plug must not touch cylinde head. If pipe plug does touch cylinder head, remove plug and grind material from small diameter end o plug. Reinstall plug.

ap. Check adapter tightness. Minimum loosening torque of adapter within shell shall be 500 lb ft before sealing compound has set up and 650 lb ft after sealing compound has set up.

aq. Tighten four socket head screws and secure cylinder head to adapter (E, fig. 14-1).

ar. Remove both bleeder plugs and install preformed packings. Retract cylinder to minimum length and install bleeder plugs. Tighten bleeder plugs finger tigh (A, fig. 14-1).

as. Plug rod eye control port to prevent entry of foreign material.

at. Test oil flow through piston valve, piston valve operation and cylinder for leaks or deformation in accordance with paragraph 14-6.

NOTE

Each reassembly of the eye into the rod requires relocation of setscrew.

au. Drill and tap hole in rod and rod eye 0.38 inch deep 0.3125-24 UNF-2B thread. Grind 0.0625 radius around rod area of hole and fair out chrome plating (I and J, fig. 14-1).

av. Apply sealing compound specification MIL-S-22477 to threaded area of set screw and install screw in rod and rod eye. Tighten screw and stake in rod eye only. Staked upset must withstand 100 lb in. removal torque (H, fig. 14-1).

aw. Tighten and lock wire bleeder plugs in accordance with standard MS33540.

ax. If identification plate was removed, use new plate as template and drill three new mounting holes 0.051 ± 0.003 inch diameter 0.125 inch deep adjacent to old mount location. Secure identification plate to cylinder with three drive screws (C, fig. 14-1).

Section III. LOCKOUT CYLINDER TESTING

14-9. General

After complete assembly of the lockout cylinder, the assembly should be bench operated to ensure proper operation prior to re-issue for installation. To accomplish this test, a suitable hydraulic pressure source must be devised that will provide controlled pressure from 0 to 3,000 psi. Suitable adapters are required to attach the hydraulic power source to the two bleeder ports and the rod eye control port. Test cylinder with hydraulic oil (OHT) specification MIL-H-6083 filtered through a 10-micron filter.

14-10. Lockout Cylinder Test

a. Remove plug from rod eye control port, designated port A for test purposes.

b. Remove bleeder plug from forward end of cylinder adjacent to rod eye, designated port B for test purposes.

c. Remove bleeder plug from rear end of cylinder adjacent to adapter, designated port C for test purposes.

d. Retract cylinder rod to minimum length and place cylinder on flat surface with ports at top. Fill cylinder with hydraulic oil (OHT). Apply 2-3 psi oil pressure through control port A and fill control valve piston and assist filling of cylinder by filling through both bleeder plug ports B and C. Fill ports slowly to make sure all air is expelled from cylinder.

e. Test oil flow through control valve piston.

(1) Remove both bleeder plugs from filled cylinder, if installed.

(2) Apply 2-3 psi hydraulic pressure at control port A.

(3) Oil should flow freely from bleed ports B and C.

f. Test control valve piston operation.

(1) Install bleeder plugs and packings in bleeder ports B and C.

(2) Apply 150 psi hydraulic pressure at control port A to compress piston spring.

(3) Maintain pressure at control port A and remove bleeder plugs from ports B and C.

(4) No leakage is allowed at port B, port C or from adapter end of cylinder rod. Relieve pressure.

g. Test cylinder head seals and cylinder rod seals.

(1) Retract cylinder rod to minimum length.

(2) Install bleeder plugs and preformed packing at bleeder ports B and C.

(3) Apply 150 psi hydraulic pressure at control port A to compress piston spring.

(4) Maintain pressure at control port A and remove bleeder plugs and preformed packing from bleeder ports B and C.

(5) Apply 3,000 psi hydraulic pressure at port B for 2 minutes.

(6) No leakage is allowed at port C, around cylinder rod seal at piston rod end, or piston rod end cylinder head to cylinder seal.

(7) Relieve hydraulic pressure at port A and port B.

(8) Install plug and preformed packing in port C and install plug in port A.

(9) Apply 3,000 psi hydraulic pressure at port B for 5 minutes.

(10) No leakage is allowed at cylinder rod seals, cylinder head-to-cylinder seals, or from adapter end of cylinder rod. No permanent distortion is allowed.

Section IV. LOCKOUT CYLINDER REPAIR STANDARDS

14-11. General

Repair standards for the lockout cylinder are listed in table 14-1 and illustrated on figure 14-2. The reference letters on the illustration are shown in the second column of the table. Each item in the table indicates the point of measurement or inspection, part name, size and fit of new part, wear limits, and code symbols to coordinate information. Wear limits indicate that point to which a part or parts may be worn before replacement in order to obtain maximum service with minimum replacement. The suffix letter L indicates a loose or clearance fit between two parts. The asterisk (*) indicates that tolerances on an individual part must be the same as on a new part. The double asterisk (**) indicates that the part may be used by selective fitting, provided that the mating part permits the fit required between the two parts.

Table 14-1. Lockout Cylinder Repair Standards

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
14-2	A	OD of pins (2 places)	1.4960 to 1.4905	1.4890 Min
14-2	B	ID of self-alining bearing (2 places)	1.4995 to 1.5015	1.5110 Max
14-2	B-A	Fit of bearing ID to OD of pins	0.0035L to 0.0110L	0.0220L Max
14-2	C	OD of self-alining bearing (2 places)	2.6875 to 2.6870	*

Table 14-1. Lockout Cylinder Repair Standards — Continued

Fig. no.	Ref. letter	Point of Measurement	Size and fit of new parts	Wea limi
14-2	D	ID of bearing carrier bore in rod eye	2.6870 to 2.6875	2.688 Max
14-2	D-C	Fit of carrier bore ID to OD of bearing (2 places)	0.0005T to 0.0005L	0.001 Max
14-2	E	OD of head packing groove	5.0250 to 5.0230	*
14-2	F	OD of cylinder head (2 places)	5.4990 to 5.4970	*
14-2	K	ID of cylinder shell (along full length)	5.5010 to 5.5050	**
14-2	K-E	Fit of shell ID to OD of head groove for packing clearance (2 places)	0.4760L to 0.4820L	*
14-2	V	OD of large diameter portion of cylinder rod	5.4990 to 5.4970	**
14-2	U	OD of cylinder rod packing groove	5.0270 to 5.0230	*
14-2	K-V	Fit of shell ID to OD of cylinder rod	0.0020L to 0.0080L	*
14-2	K-U	Fit of shell ID to OD of cylinder rod groove for packing clearance	0.4740 to 0.4820	*
14-2	L	OD of control valve piston lands	1.4980 to 1.4950	**
14-2	X-L	Fit of rod ID to OD of piston lands	0.0020L to 0.0070L	*
14-2	X-P	Fit of rod ID to OD of piston packing groove for packing clearance	0.2320L to 0.2360L	*
14-2	X	ID of cylinder rod extending between points 6 in., from either end of rod, except for 2 relief areas	1.5000 to 1.5020	**
14-2	N	OD of middle group of control valve piston lands	1.4990 to 1.4980	**
14-2	P	OD of piston packing grooves	1.2680 to 1.2660	*
14-2	X-N	Fit of rod ID to OD of middle group of piston lands	0.0010L to 0.0040L	*
14-2	Q	OD of control valve piston lands at spacer end	1.4980 to 1.4950	**
14-2	S	OD of cylinder rod (2 places)	2.4990 to 2.4970	**
14-2	G	ID of cylinder head (2 places)	2.5010 to 2.5030	**
14-2	H	ID of head packing groove (2 places)	2.8680 to 2.8720	*
14-2	G-S	Fit of head ID to OD of rod (2 places)	0.0020L to 0.0060L	0.0070L Max
14-2	H-S	Fit of head groove ID to OD of rod for packing clearance (2 places)	0.3690 to 0.3750	0.3760 Max
14-2	J	Control valve piston return spring free length	8.4375 to 8.5000	8.4100 Min
14-2	J	Control valve PISTON RETURN spring, load to compress to a length of 4-½ inches	220 lbs.	190 lbs Min

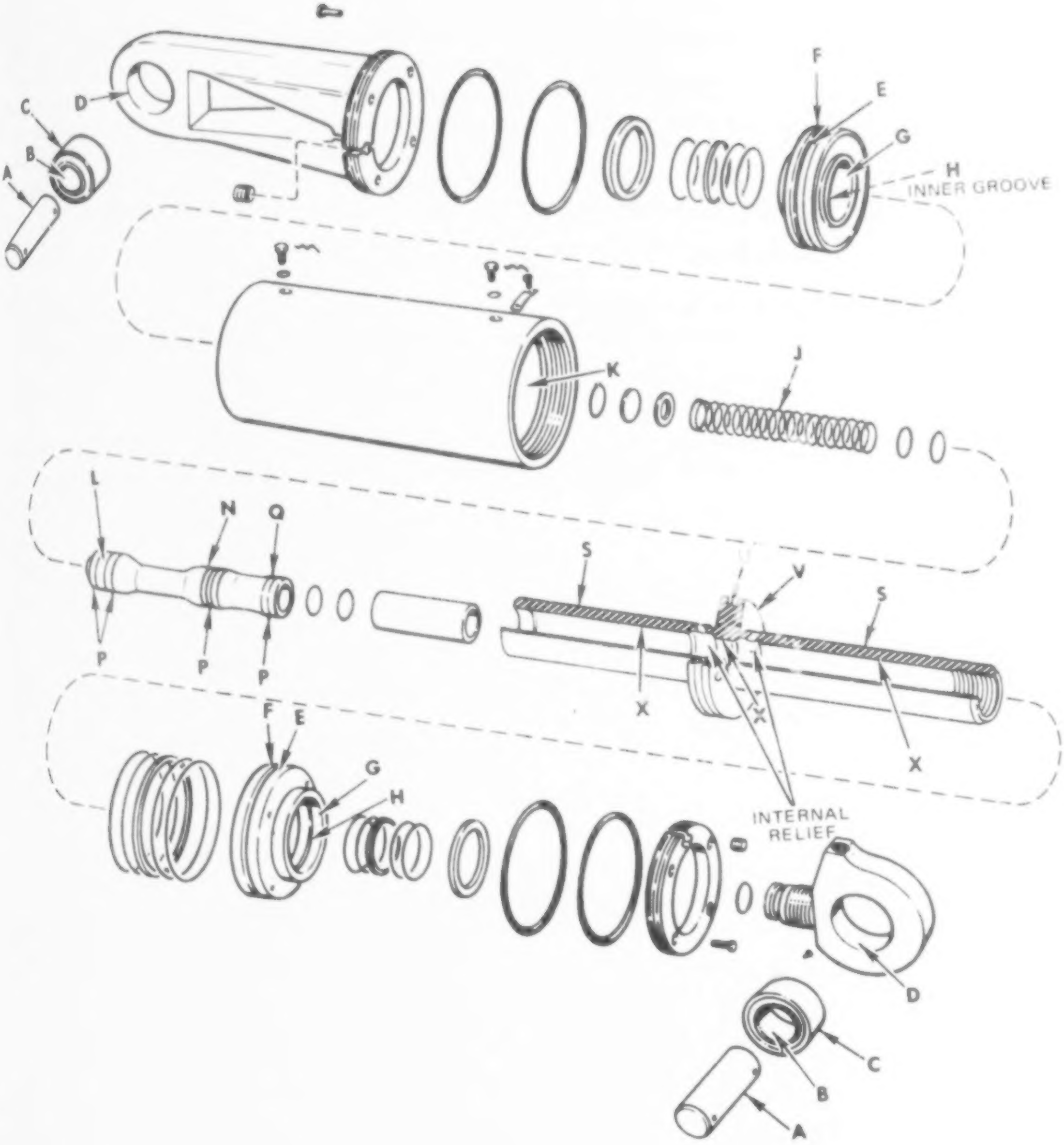

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Figure 14-2. Lockout cylinder measurement and inspection points.

CHAPTER 15
SEAT REPAIR

Section I. DESCRIPTION AND DATA

15-1. Description and Operation

The M107 Vehicle and M110/M110A1 Vehicles are equipped with two seats. The driver's seat (P/N 10901351) is equipped with controls to permit horizontal and vertical adjustment of the seat. A simple, foldable personnel seat is mounted on the right rear of the hull. For information on the gunner seats, refer to TM 9-2300-216-34-2.

15-2. Data

Driver's Seat:	
Military number	10901351
Personnel Seat:	
Military number	10902155

Section II. DRIVER'S SEAT REPAIR

15-3. General

For information on disassembly, cleaning, inspection, repair and assembly of the driver's seat, refer to TM 9-2300-216-20.

Section III. PERSONNEL SEAT REPAIR

15-4. General

For information on disassembly, cleaning, inspection, repair and assembly of the personnel seat, refer to TM 9-2300-216-20.

CHAPTER 16
SUSPENSION SYSTEM REPAIR

Section I. DESCRIPTION AND DATA

16-1. Description and Operation

a. *Wheel Suspension System.* The suspension system is of the conventional torsion bar, flat-tracked, front-drive type. The vehicle is supported by a total of 10 pairs of road wheels and 10 individually sprung roadwheel arms. The two rear wheels are secured to an arm equipped with an eccentric spindle to permit positioning the arm longitudinally to provide adjustment of track tension. These wheels are referred to as trailing idler wheels to differentiate from the regular roadwheels. Each roadwheel arm is connected by internal splines to a torsion bar installed transversely across the bottom of the hull, and by external splines through a link to a hydraulic lockout cylinder. The lockout cylinder serves both as a shock absorber during travel of the vehicle, and as a device to lock the suspension to provide a more stable platform during firing operations. A suspension lockout valve in the driver's compartment controls hydraulic pressure from the hull hydraulic system to the lockout cylinders.

NOTE

M107 vehicle serial numbers 1 through 296, M110/M110A1 vehicles serial numbers 1 through 412 and M110A1 vehicles serial numbers 1-1 through 296-1 were initially equipped with ten lockout cylyinders. M107 vehicles serial numbers 297 and on, M110/M110A1 vehicle serial numbers 413 and on and M110A1 vehicle serial numbers 297-1 and on are equipped with eight lockout cylinders.

b. *Roadwheels.* Ten pairs of rubber-tired, solid disk wheels support the vehicle. Each pair of wheels is secured to the hub by means of ten hub studs and self-locking nuts. The wheels roll on the tracks driven by the final drive sprockets located at the front of the hull.

c. *Torsion Bars and Sockets.* The torsion bars and lockout cylinders are provided to absorb road shocks while the vehicle is in operation. Each torsion bar is connected to a roadwheel arm at one end and a torsion bar anchor at the other end. The torsion bar anchor is located securely to the hull. Splines within the anchor and splines within the roadwheel arms serve to maintain rotational resistance necessary for imparting spring action to the roadwheel arms.

d. *Roadwheel Arm and Hub Assemblies.* All roadwheel arms are supported in the vehicle hull by a set of needle bearings (on each arm) housed in supports welded to the hull. Internal splines connect the roadwheel arms to the torsion bars and external splines on the arms connect the roadwheel arm to the lockout cylinder arm. Each roadwheel hub is supported by two roller bearings mounted on the roadwheel arm spindle. Studs in the hub are provided to mount the pair of roadwheels. The hubs and hull are also equipped with external grease fittings to permit lubricating the bearings in the hub and hull.

e. *Trailing Idler Wheel Arm and Hub Assemblies.* The trailing idler wheel arm and hub consist of a trailing idler arm, an eccentric spindle, and a hub. The trailing idler arm is supported by a set of needle bearings housed in a support welded to the hull. Internal splines connect the roadwheel arm to the torsion bar and external splines connect the roadwheel arm to the lockout cylinder arm. The eccentric spindle is threaded into the trailing idler arm and is secured by means of two clamping bolts and nuts on "A" vehicles or two clamping bolts, washers and nuts on "B" vehicles. Since the spindle is not centered in the trailing idler arm, rotation of the spindle in the arm permits longitudinal positioning of spindle and the trailing idler wheel to permit adjusting track tension. The trailing idler wheel hub is supported by two roller bearings mounted on the trailing idler wheel spindle. Studs are provided in the hub to mount the pair of roadwheels. External grease fittings are provided in the hub and hull to permit lubricating the bearings in the hub and hull.

f. *Tracks.* The vehicle is equipped with two, single-pin, rubber-bushed, steel tracks with rubber pads. The right track contains 76 track shoe assemblies. The left track contains 75 track shoe assemblies. Each track shoe consists of a cast steel body with integral grousers and center guide, a removable rubber pad, a connecting track pin, and two self-locking nuts and washers.

16-2. Data

Roadwheel and Idler Wheel: Military number	10891631
Roadwheel Arm and Hub Assembly: Military number	10891653
Idler Wheel Arm and Hub Assembly: Military number	10891675
Socket (Front and Intermediate Torsion Bar Anchors): Military number	10891608
Socket (Right Idler Wheel Torsion Bar Anchor): Military number	10908355
Socket (Left Idler Wheel Torsion Bar Anchor): Military number	10908356
Track Shoe Assembly: Military number	10934639
Final Drive (Right Hand): Military number	8351825

Final Drive (Left Hand):
Military number 8351824
Drive Sprocket:
Military number 10891835
Hub:
Military number 10898262

Section II. TRACK ASSEMBLY REPAIR

16-3. General

For information on disassembly, cleaning, inspection, repair and assembly of the track, refer to TM 9-2300-216-20.

Section III. FINAL DRIVES, HUBS AND SPROCKETS

16-4. General

For information on disassembly, cleaning, inspection, repair and assembly of the final drives, refer to TM 9-2520-234-35. For information on disassembly, cleaning, inspection, repair and assembly of the hubs and sprockets, refer to TM 9-2300-216-20. Measure and inspect parts in accordance with wear limits specified in table 16-1. Replace parts worn beyond specified wear limits.

Section IV. ROADWHEEL REPAIR

16-5. General

For information on disassembly, cleaning, inspection, repair and assembly of the roadwheels, refer to TM 9-2300-216-20.

Section V. TORSION BARS AND SOCKETS REPAIR

16-6. General

Repair of torsion bars and sockets is not allocated. Replace defective torsion bars or sockets with new serviceable units.

Section VI. ROADWHEEL ARM AND HUB ASSEMBLY REPAIR

16-7. General

For information on disassembly, cleaning, inspection, repair and assembly of the roadwheel arm and hub, refer to TM 9-2300-216-20. Measure and inspect parts in accordance with wear limits specified in tables 16-2 and 16-3. Replace parts worn beyond specified wear limits. Overhaul of the roadwheel arm and hub assembly is allocated to general support maintenance personnel.

Section VII. IDLER WHEEL ARM AND HUB ASSEMBLY REPAIR

16-8. General

For information on disassembly, cleaning, inspection, repair and assembly of the idler wheel arm and hub assembly, refer to TM 9-2300-216-20. Measure and inspect parts in accordance with wear limits specified in tables 16-4 and 16-5. Replace parts worn beyond specified wear limits. Overhaul of the idler wheel arm and hub assembly is allocated to general support maintenance.

Section VIII. SUSPENSION SYSTEM REPAIR STANDARDS

16-9. General

Repair standards for the drive sprockets are listed in table 16-1 and illustrated in figure 16-1; repair standards for the roadwheel arm are listed in table 16-2 and illustrated in figure 16-2; repair standards for the roadwheel arm and hub are listed in table 16-3 and illustrated in figure 16-3; repair standards for the trailing idler wheel arm are listed in table 16-4 and illustrated in figure 16-4; repair standards for the trailing idler wheel arm and hub are listed in table 16-5 and illustrated in figure 16-5. The reference letters on the illustration are shown in the second column of the table. Each item in the table indicates the point of measurement or inspection, part name, size and fit of new part, wear limits, and code symbols to coordinate information. Wear limits indicate that point to which a part or parts may be worn before replacement. The suffix letter L indicates a loose or clearance fit between two parts. The suffix letter T indicates a tight or interference fit between two parts. The asterisk (*) indicates part must be the same as a new part.

Table 16-1. Drive Sprocket Repair Standards

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
16-1	A	Sprocket teeth profile. Use gage 11631464 to measure wear on sprocket teeth. (1) Clean sprocket teeth and sprocket screw heads. (2) Center gage against screw heads and measure sprocket teeth. (3) Reject sprocket when any part of tooth profile wears to gage profile. Sprockets that are worn on one side only, not beyond gage profile, may be reversed on the hub to prolong life of sprockets. Make sure both sprockets are worn equally on one hub.		

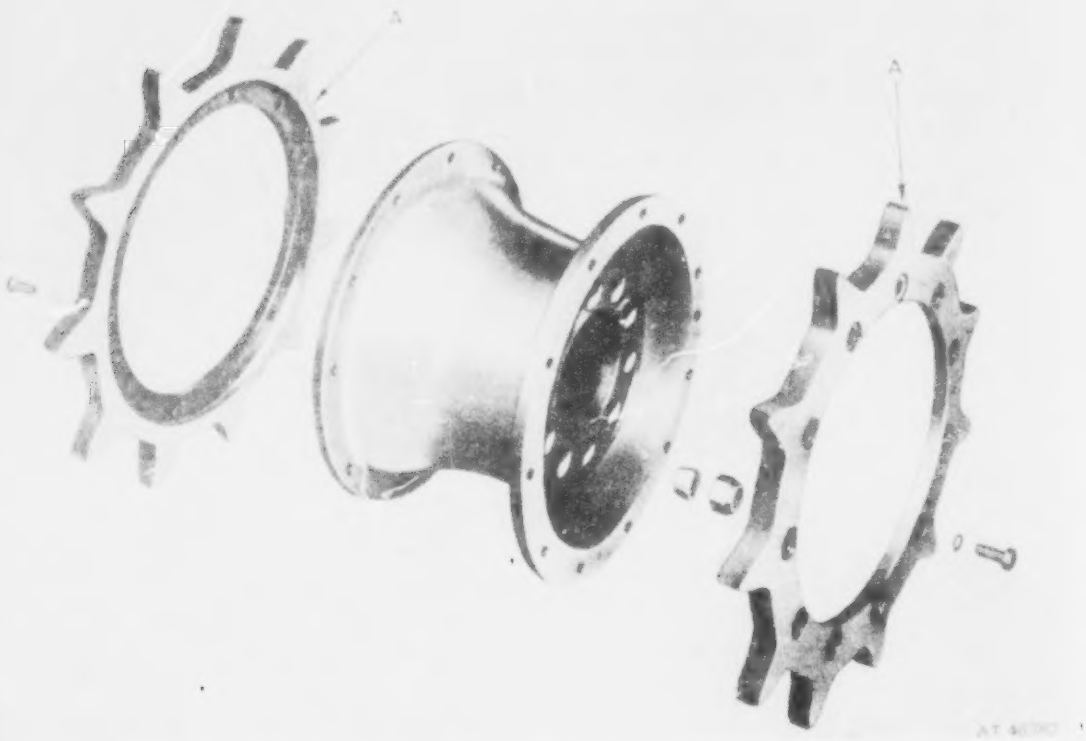

Figure 16-1. Drive sprocket measurement and inspection points.

Table 16-2. Roadwheel Arm Repair Standards

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
16-2	A	OD of inner support bearing outer race	6.000 to 5.9990	*
		ID of hull machining bore for inner support bearing	6.0005 to 6.0030	6.0050
		Fit of outer race OD to ID of bore in hull	0.0005L to 0.0040L	0.0060L
16-2	B	ID on inner support bearing inner race	4.2492 to 4.2500	*
16-2	B-F	Fit of bearing surface OD to ID of inner race	0.0002L to 0.0020L	0.0050L
16-2	C	Lockout cylinder remote control lever (connecting) arm internal spline: measurement between 0.1440 pins	4.2430 to 4.2447	4.2647
16-2	D	OD of outer support bearing	6.0000 to 5.9990	*
		ID of hull machining bore for outer wheel support bearing	6.0005 to 6.0030	6.0050
		Fit of support bearing OD to ID of bore in hull	0.0005L to 0.0040L	0.0060L
16-2	E	ID of outer support bearing	4.4990 to 4.5000	*
16-2	E-G	Fit of bearing surface OD to ID of bearing	0.0005T to 0.0015L	0.0045L
16-2	F	OD of inner support bearing surface on roadwheel arm	4.2490 to 4.2480	4.2450
16-2	G	OD of outer support bearing surface roadwheel arm	4.4995 to 4.4985	4.4955
16-2	H	Torsion bar serrations (small end of bar): measurement over 0.1300 pins	2.3390 to 2.3410	2.3340
16-2	J	Torsion bar serrations (large end of bar): measurement over 0.1300 pins	2.4400 to 2.4420	2.4350

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Table 16-2. Roadwheel Army Repair Standards — Continued

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	We lim
		NOTE At assembly arrow marked on large end of torsion bars shall point counterclockwise for roadwheels on left side of vehicle. Arrow shall point clockwise on torsion bars for roadwheels on right side of vehicle.		
16-2	K	Torsion bar socket internal serration: measurement between 0.1150 diameter pins	1.9158 to 1.9178	1.927

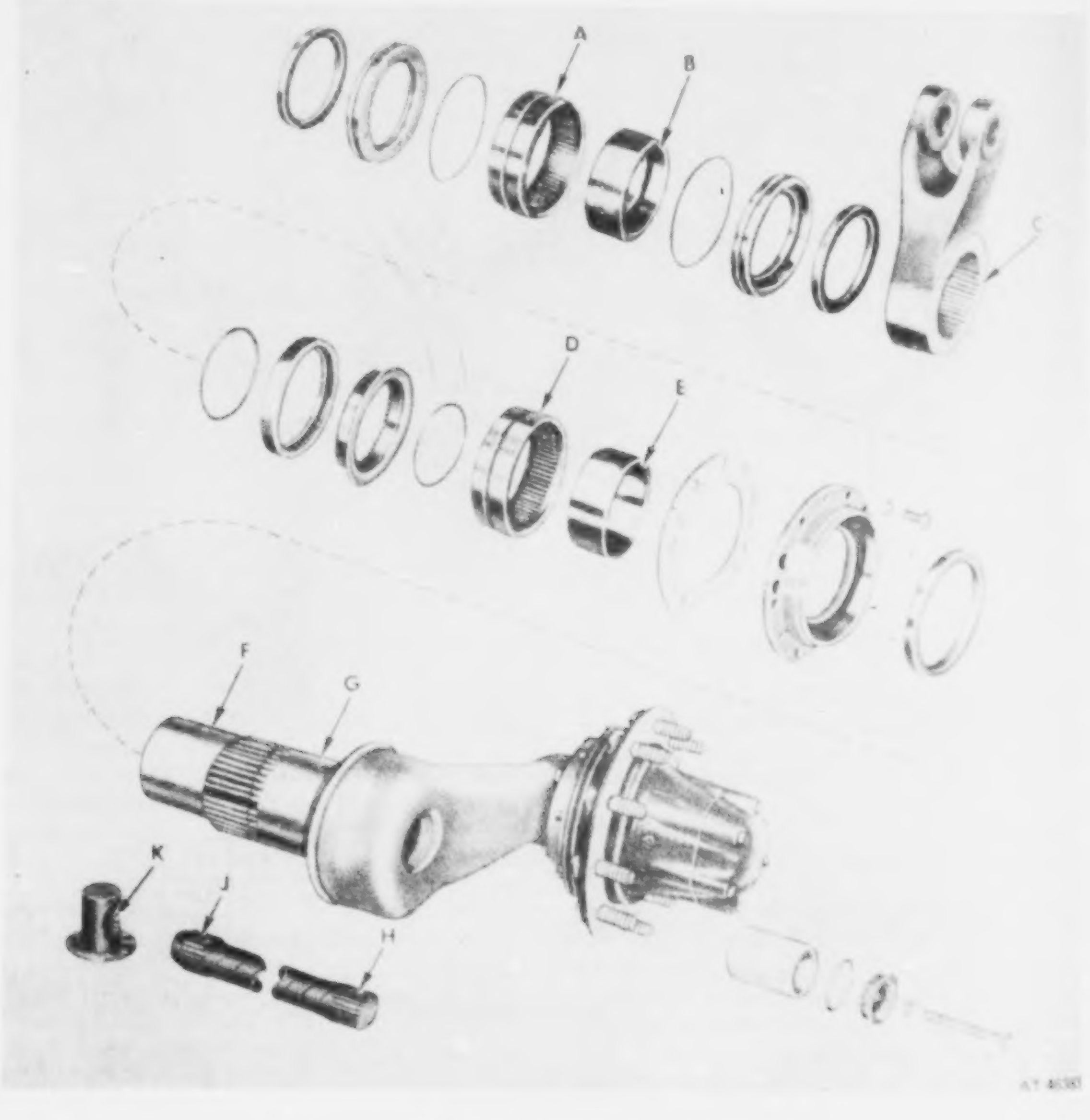

Figure 16-2. Roadwheel arm measurement and inspection points.

Table 16-3. Roadwheel Arm and Hub Repair Standards

Fig no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
16-3	A	Roadwheel arm spline: measurement over 0.1920 pins	4.6940 to 4.6964	4.6767
16-3	B	Roadwheel arm internal serrations: measurement between 0.1150 pins	2.0080 to 2.0180	2.0380
16-3	C	OD of inner bearing surface on roadwheel arm	3.2498 to 3.2488	3.2440
16-3	C-E	Fit of bearing surface OD to ID of bearing cone	0.0002L to 0.0017L	0.0070L
16-3	D	OD of outer bearing surface on roadwheel arm	1.9998 to 1.9988	1.9943
16-3	D-K	Fit of bearing surface OD to ID of bearing cone	0.0002L to 0.0017L	0.0062L
16-3	E	ID of bearing cone	3.2500 to 3.2505	*
16-3	F	OD of bearing cup	5.9100 to 5.9090	*
16-3	F-G	Fit of bearing cup OD to ID of bore	0.0060T to 0.0040T	*
16-3	G	ID of bore in roadwheel hub	5.9040 to 5.9050	*
16-3	H	ID of bore in roadwheel hub	3.9960 to 3.9970	*
16-3	H-J	Fit of bearing cup OD to ID of bore	0.0050T to 0.0030T	*
16-3	J	OD of bearing cup	4.0010 to 4.0000	*
16-3	K	ID of bearing cone	2.0000 to 2.0005	*

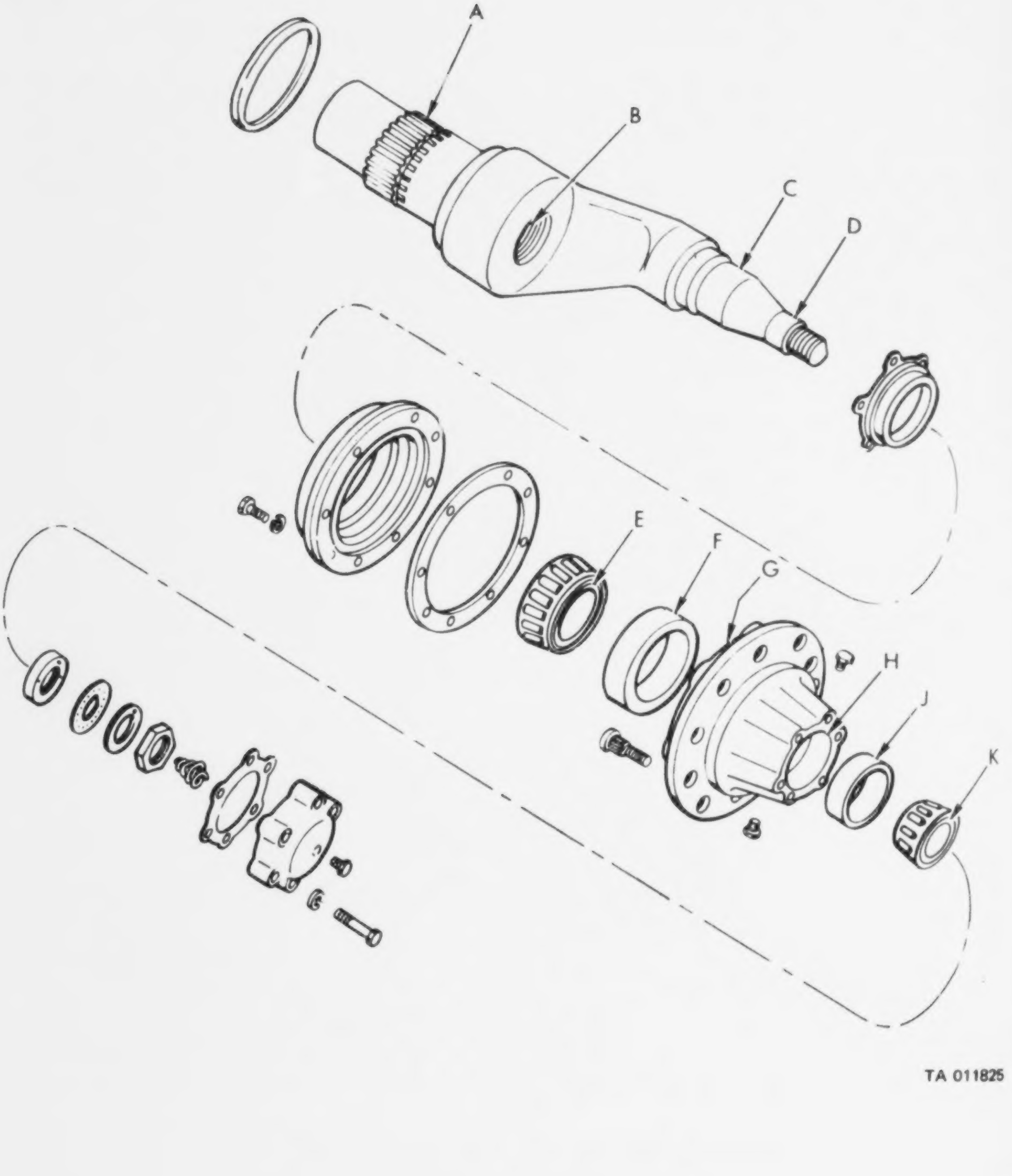
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Figure 16-3. Roadwheel arm and hub measurement and inspection points.

Table 16-4 Trailing Idler Wheel Arm Repair Standards

Fig no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
16-4	A	OD of inner support bearing outer race	5.2500 to 5.2490	*
		ID of hull machining bore for inner trailing idler wheel support bearing	5.2496 to 5.2521	5.2541
		Fit of outer race OD to ID of bore in hull	0.0004T to 0.0031L	0.0051L
16-4	B	ID of inner bearing inner race	3.7492 to 3.7400	*
16-4	B-G	Fit of bearing surface OD to ID of inner race	0.0015T to 0.0003L	0.0023L
16-4	C	Lockout cylinder remote control lever (connecting) arm internal spline: measurement between 0.1440 pins	4.2430 to 4.2447	4.2647
16-4	D	OD of outer bearing outer race	8.0000 to 7.9988	*
		ID of hull machining bore for outer trailing idler wheel support bearing	7.9996 to 8.0021	8.0046
		Fit of outer race OD to ID of bore in hull	0.0004T to 0.0033L	0.0058L
16-4	E	ID of outer bearing inner race	5.4990 to 5.5000	*
16-4	E-F	Fit of bearing surface OD to ID of inner race	0.0015T to 0.0005L	0.0025L
16-4	F	OD of outer support bearing surface on trailing idler wheel arm	5.5005 to 5.4995	5.4975
16-4	G	OD of inner support bearing surface on trailing idler wheel arm	3.7507 to 3.7497	3.7477
16-4	H	Torsion bar serrations (small end of bar): measurement over 0.1300 pins	2.3390 to 2.3410	2.3340
16-4	J	Torsion bar serrations (large end of bar): measurement over 0.1300 pins	2.4400 to 2.4420	2.4350
		NOTE At assembly, arrow marked on large end of torsion bars shall point counterclockwise for right hand trailing idler wheel. Arrow shall point clockwise on torsion bars for left hand trailing idler wheel.		
16-4	K	Torsion bar socket internal serration: measurement between 0.1150 diameter pins	1.9158 to 1.9178	1.9278

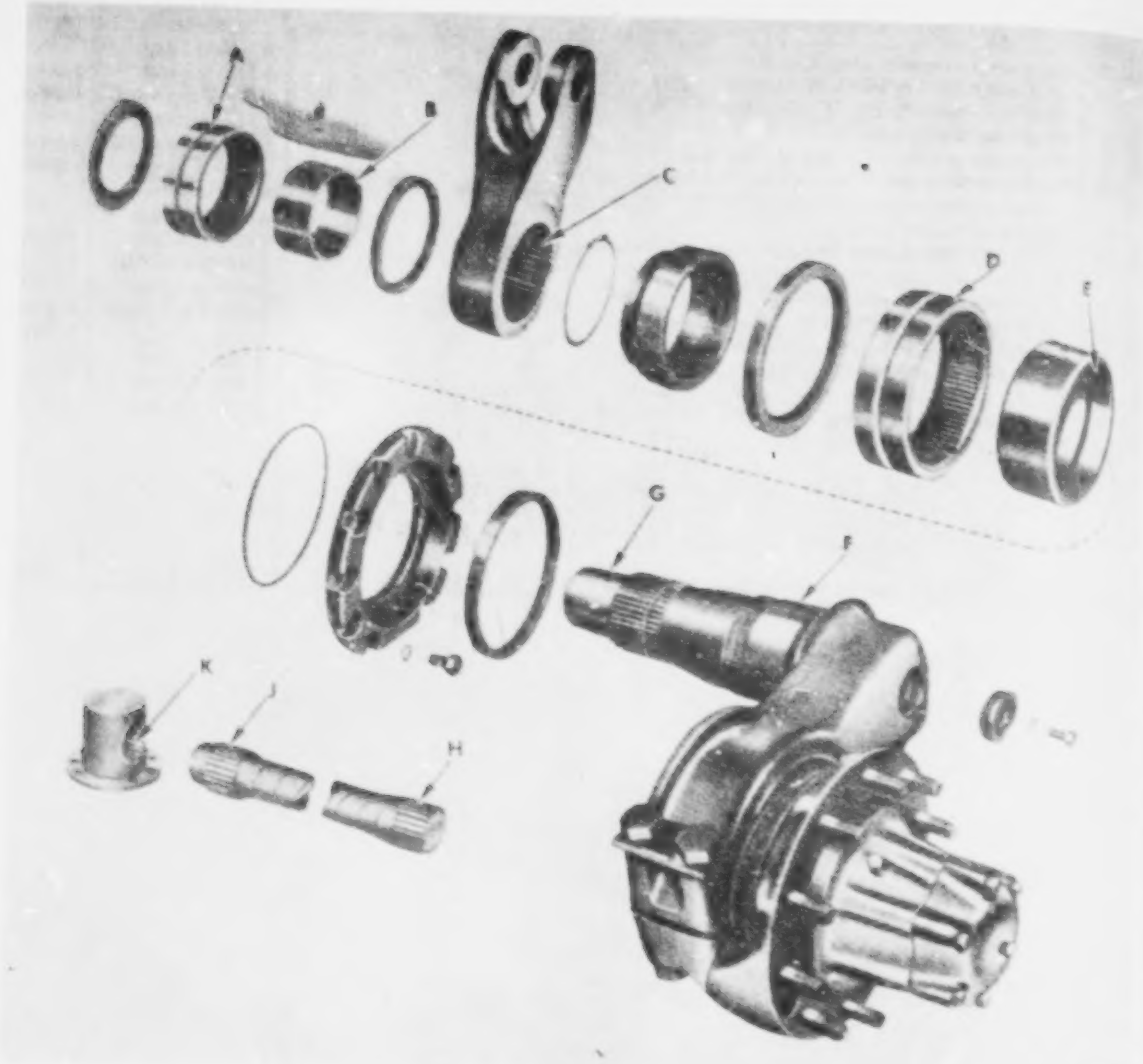

Figure 16-4. Trailing idler wheel arm measurement and inspection points.

Table 16-5. Trailing Idler Wheel Arm and Hub Repair Standards

Fig. no.	Ref. letter	Point of measurement	Size and fit of new parts	Wear limits
16-5	A	Trailing idler wheel arm spline: OD measurement over 0.1920 pins	4.6990 to 4.6966	4.6767
16-5	B	Traiiing idler wheel arm serrations: ID measurement between 0.1150 pins	2.0080 to 2.0180	2.0380
16-5	C	OD of inner bearing surface in idler wheel eccentric spindle	3.2498 to 3.2488	3.2440
16-5	C-E	Fit of bearing surface OD to ID of bearing cone	0.0002L to 0.0017L	0.0065L
16-5	D	OD of outer bearing surface on idler wheel eccentric spindle	1.9998 to 1.9988	1.9943
16-5	D-F	Fit of bearing surface OD to ID of bearing cone	0.0002L to 0.0017L	0.0062L
16-5	E	ID of bearing cone	3.2500 to 3.2505	•
16-5	F	ID of bearing cone	2.000 to 2.0005	•
16-5	G	OD of bearing cup	4.0010 to 4.0000	•
16-5	G-H	Fit of bearing cup OD to ID bore	0.0030T to 0.0010T	•
16-5	H	ID of bore in idler wheel hub	3.9980 to 3.9990	•
16-5	J	ID of bore in trailing idler hub	5.9060 to 5.9080	•
16-5	J-K	Fit of bearing cup OD to ID of bore	0.0040T to 0.0010T	•
16-5	K	OD of bearing cup	5.9100 to 5.9090	•

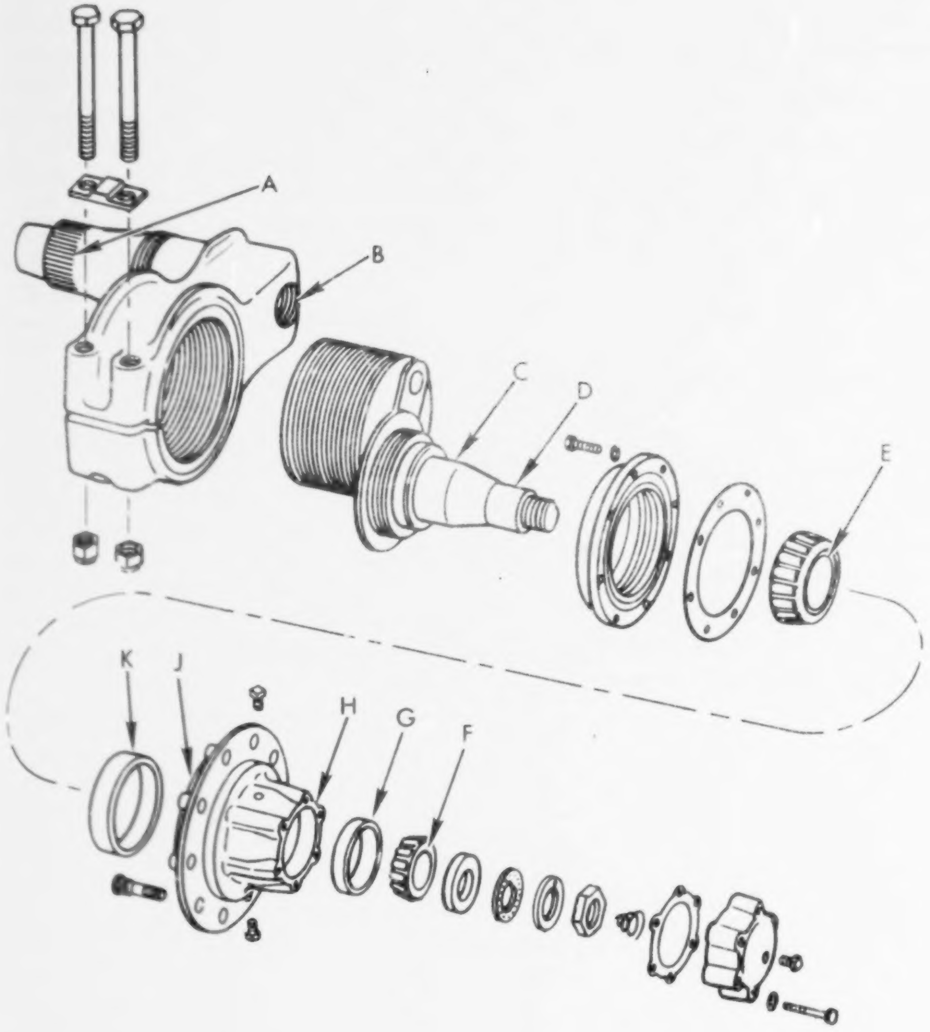
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Figure 16-5. Trailing idler wheel arm and hub measurement and inspection points.

CHAPTER 17
HULL DOORS, PLATES AND DECKS REPAIR

Section I. DESCRIPTION AND DATA

17-1. Description

a. Hull Doors and Decks. The hull doors and decks consist of hull exterior access doors, hull interior access doors, and engine and transmission decks.

b. Miscellaneous Covers, Plates, Trays, and Brackets. The miscellaneous covers, plates, trays and brackets consist mainly of covers and plates that require no disassembly, and trays and brackets for retention of basic issue items (BII) located on the hull.

17-2. Data

Forward Air Cleaner Blower Access Door Assembly:	
Military number	10903996
Battery Compartment Access Door Assembly:	
Military number	10904338
Air Cleaner Filter Access Door Assembly:	
Military number	11643000
Air Cleaner Filter Access Door Handle Assembly:	
Military number	10908744
Fuel Filter Access Door Assembly:	
Military number	11643066
Engine Deck Assembly:	
Military number	10956703
Transmission Deck Assembly:	
Military number	10956704

Section II. HULL DOORS AND DECKS REPAIR

17-3. General

This section provides information for the disassembly, cleaning, inspection, repair and assembly of the hull doors and decks. For information on disassembly, cleaning, inspection, repair and assembly of hull covers, drains, brackets, trays, straps, and plugs not covered in this section, refer to TM 9-2300-216-20.

17-4. Forward Air Cleaner Blower Access Door Repair

a. Air Cleaner Blower Access Door Disassembly (fig. 17-1).

(1) Remove three screws and lock washers attaching handle to door.

(2) Remove four screws, lock washers and washers attaching lock support to door.

(3) Remove lock support, lock and two spacers.

(4) Remove seal, if worn or damaged, using scraper to separate seal from rubber adhesive bonding.

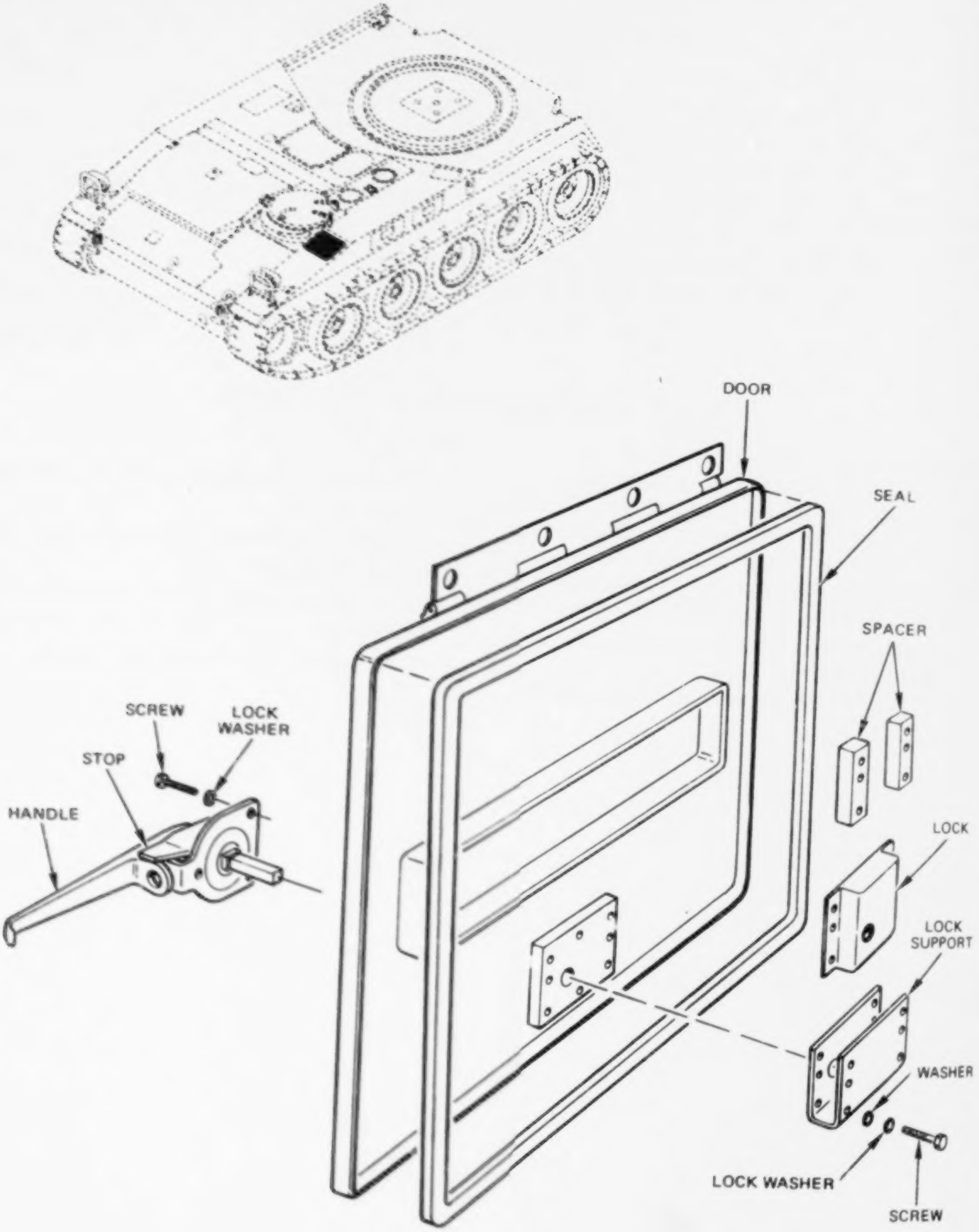

DOOR
SEAL
SPACER
SCREW
LOCK WASHER
STOP
HANDLE
LOCK
LOCK SUPPORT
WASHER
LOCK WASHER
SCREW
AT 46393

Figure 17-1. Forward air cleaner blower access door disassembly or assembly.

b. Cleaning.

(1) Clean door and related parts with dry-cleaning solvent (SD-2).

(2) Clean rubber adhesive from door, if seal was removed, using scraper, dry-cleaning solvent (SD-2) and crocus cloth.

(3) Dry clean parts with low pressure compressed air.

c. Inspection.

(1) Inspect for physical damage, breaks, cracks, sharp ragged edges, deformation, rust or paint damage.

(2) Inspect lock for proper operation, without binding or catching.

(3) Inspect attaching hardware for damage.

d. Repair.

(1) Smooth sharp edges with a fine mill file.

(2) Weld small breaks or cracks in plate.

(3) Replace defective parts with new serviceable parts.

(4) Sand down paint damaged areas and touch-up, using enamel to match existing color (olive drab enamel, federal specification TT-E-529). Apply one coat of primer (MIL-P-8585) to aluminum alloys, or rust inhibitor primer (TT-P-659) to carbon steel. Allow primer to dry a minimum of 30 minutes before applying enamel.

e. Air Cleaner Blower Access Door Assembly (fig. 17-1). Assemble the air cleaner blower access door in the reverse order of disassembly. Bond seals to door using Adhesive Rubber Type III, specification MMM-A-1617.

17-5. Battery Compartment Access Door Repair

a. Battery Compartment Access Door Disassembly (fig. 17-2).

(1) Remove cotter pin from each latch arm.

(2) Remove right hand and left hand rod from latches and door handle case.

(3) Remove four screws from left hand and right hand latches and remove latches from door.

(4) Remove four rivets attaching door handle case to door and remove door handle case and gasket.

(5) Remove eleven rivets attaching hinge to door and remove hinge.

(6) Remove seals, if worn or damaged, using scraper to separate seals from adhesive bonding.

b. Cleaning.

(1) Clean door and parts with dry-cleaning solvent (SD-2).

(2) Clean rubber adhesive from door, if seals were removed, using scraper, dry-cleaning solvent (SD-2) and crocus cloth.

(3) Dry clean parts with low pressure compressed air.

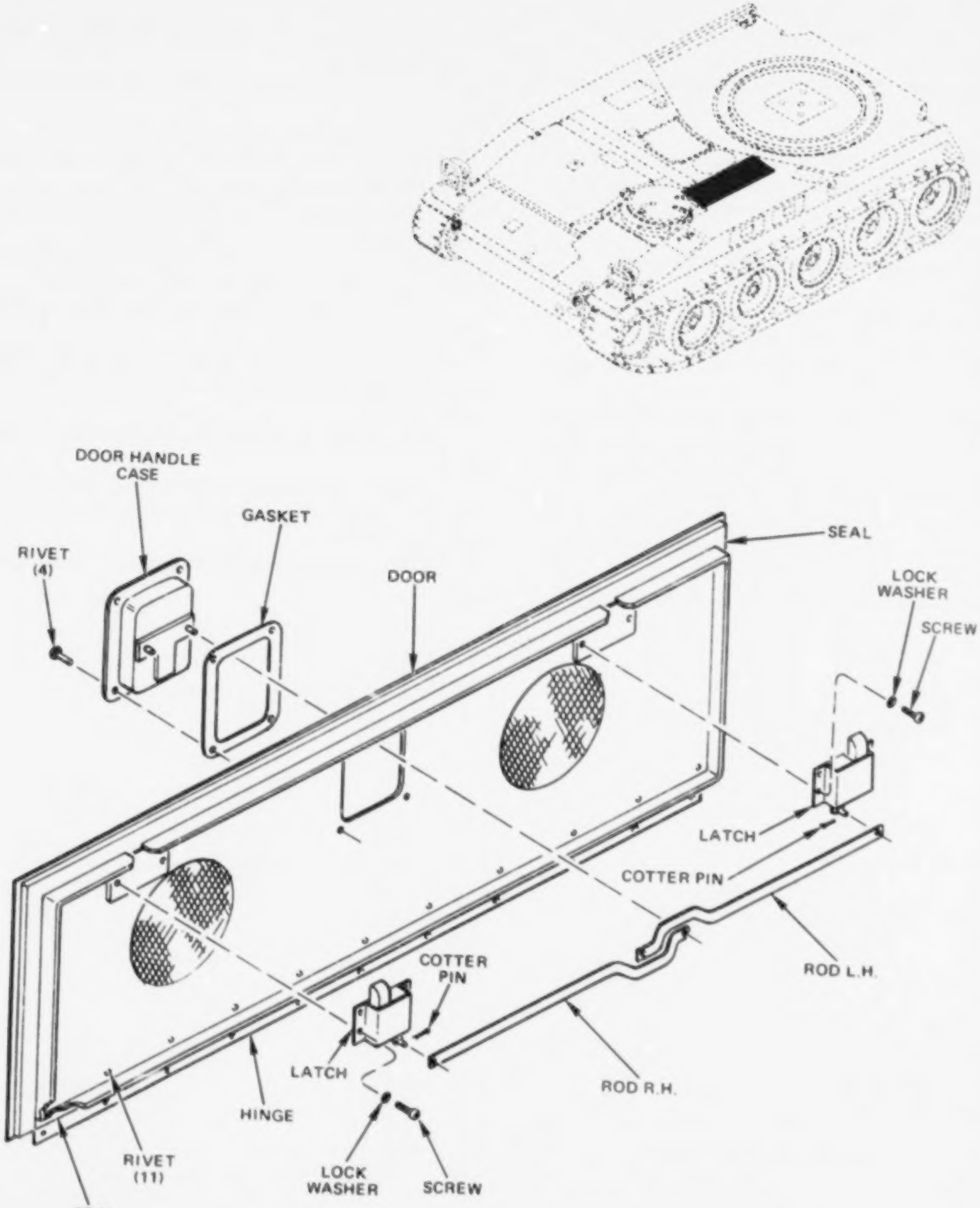

DOOR HANDLE CASE
GASKET
RIVET (4)
DOOR
SEAL
LOCK WASHER
SCREW
LATCH
COTTER PIN
ROD L.H.
COTTER PIN
LATCH
ROD R.H.
HINGE
RIVET (11)
LOCK WASHER
SCREW
SEAL
AT 46394

Figure 17-2. Battery compartment access door disassembly or assembly.

c. Inspection.

(1) Inspect for physical damage, breaks, cracks, sharp ragged edges, deformation, rust and paint damage.

(2) Inspect latches for operation without binding or catching.

(3) Inspect attaching hardware for damage.

d. Repair.

(1) Smooth sharp edges with a fine mill file.

(2) Replace defective parts with new serviceable parts.

(3) Sand down paint damaged areas and touch-up, using enamel to match existing color (white enamel, federal specification TT-E-489; olive drab enamel, federal specification TT-E-529). Apply one coat of primer (MIL-P-8585) to aluminum alloys or rust inhibitor primer (TT-P-659) to carbon steel. Allow primer to dry for a minimum of 30 minutes before applying enamel.

e. Battery Compartment Access Door Assembly (fig. 17-2). Assemble battery compartment access door in the reverse order of disassembly. Bond seals to door using Adhesive Rubber Type III, specification MMM-A-1617.

17-6. Air Cleaner Filter Access Door Repair

a. Air Cleaner Filter Access Door Disassembly (fig. 17-3 and 17-4).

(1) Open ears of clip spring and slide off door handle shaft.

(2) Remove two cotter pins from headed pins and remove two arms from latch and handle assembly.

(3) Remove four screws and lock washers attaching each latch and shim to door and remove latch and shim.

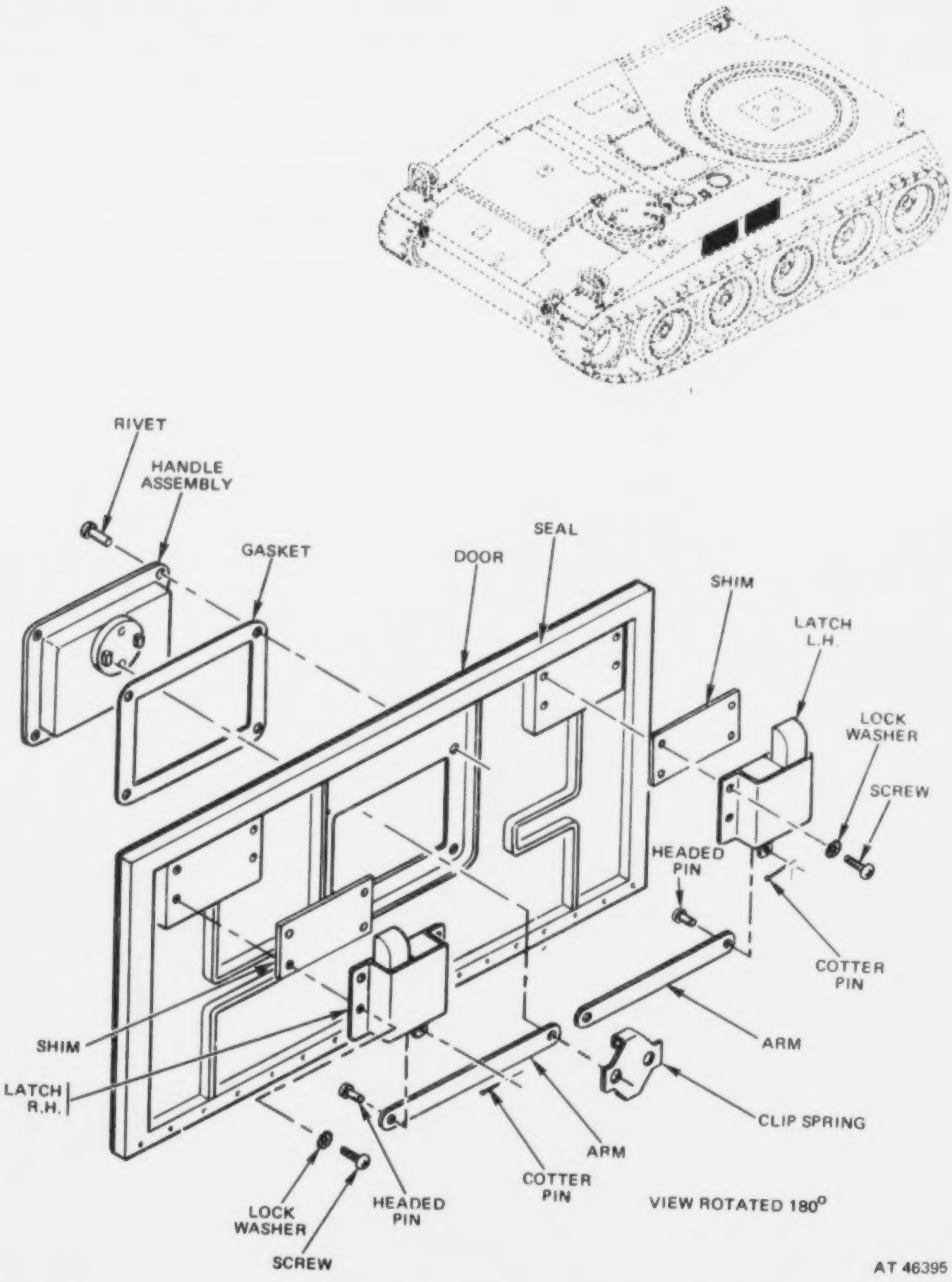
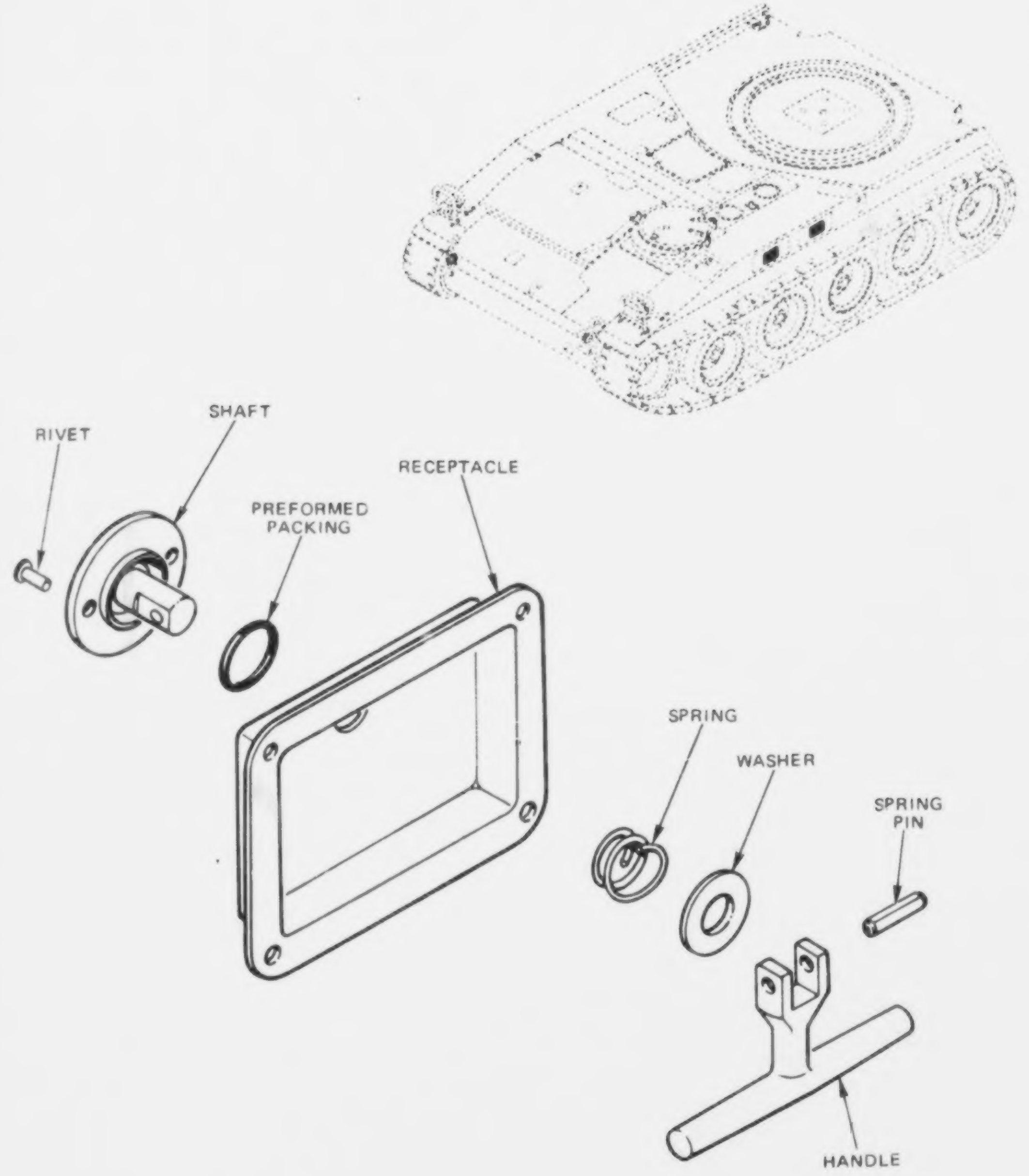

RIVET
HANDLE ASSEMBLY
GASKET
DOOR
SEAL
SHIM
LATCH L.H.
LOCK WASHER
SCREW
HEADED PIN
COTTER PIN
ARM
CLIP SPRING
SHIM
LATCH R.H.
ARM
COTTER PIN
HEADED PIN
LOCK WASHER
SCREW
VIEW ROTATED 180°
AT 46395

Figure 17-3. Air cleaner filter access door disassembly or assembly.


SHAFT
RIVET
RECEPTACLE
PREFORMED PACKING
SPRING
WASHER
SPRING PIN
HANDLE

AT 46396

Figure 17-4. Air cleaner filter access door handle disassembly or assembly.

(4) Remove four rivets attaching handle assembly and gasket to door. Remove handle assembly and gasket.

(5) Remove seal from door, if worn or damaged, using scraper to separate seal from adhesive bonding.

(6) Drive spring pin from handle (fig. 17-4).

(7) Remove handle, washer, spring, preformed packing and shaft from receptacle (fig. 17-4).

(8) Remove two rivets from shaft (fig. 17-4).

NOTE

Rivets are staked to shaft to prevent turning.

b. Cleaning.

(1) Clean all parts with dry-cleaning solvent (SD-2).

(2) Clean rubber adhesive from door in gasket and seal area using scraper, dry-cleaning solvent (SD-2) and crocus cloth.

c. Inspection.

(1) Inspect for physical damage, breaks, cracks, sharp ragged edges, deformation, rust and paint damage.

(2) Inspect latches and handle for proper operation without binding or catching.

(3) Inspect attaching hardware for damage.

d. Repair.

(1) Smooth sharp edges with a fine mill file.

(2) Weld small cracks or breaks in plate.

(3) Replace defective parts with new serviceable parts.

(4) Sand down paint damaged areas and touch-up, using enamel to match existing color (olive drab enamel, federal specification TT-E-529). Apply one coat of primer (MIL-P-8585) to aluminum alloys, or rust inhibitor primer (TT-P-659) to carbon steel. Allow primer to dry for a minimum of 30 minutes before applying enamel.

e. Air Cleaner Filter Access Door Assembly (figs. 17-3 and 17-4). Assemble air cleaner filter access door in the reverse order of disassembly. Stake rivets to handle shaft to prevent turning. Bond gasket to door using Adhesive, Rubber Type II, specification MMM-A-1617; bond seal to door using Adhesive, Rubber Type III, specification MMM-A-1617.

17-7. Fuel Filter Access Door Repair.

a. Fuel Filter Access Door Disassembly (fig. 17-5).

(1) Remove two screws and washers attaching retainer to door. Remove retainer.

(2) Remove cotter pin and slotted nut from handle shaft.

(3) Pull handle and spring washer from door.

(4) Remove spacer, washer, wheel, spring and collar from door.

(5) Remove cushioning pad, only if worn or damaged, using scraper to separate pad from adhesive bonding.

b. Cleaning.

(1) Clean parts with dry-cleaning solvent (SD-2).

(2) Clean adhesive bonding from front of door, if cushioning pad has been removed, using scraper, dry-cleaning solvent (SD-2) and crocus cloth.

(3) Dry clean parts with low pressure compressed air.

c. Inspection.

(1) Inspect for physical damage, cracks, breaks, sharp ragged edges, deformation, rust and paint damage.

(2) Inspect threaded parts for worn or damaged threads.

(3) Inspect attaching hardware for damage.

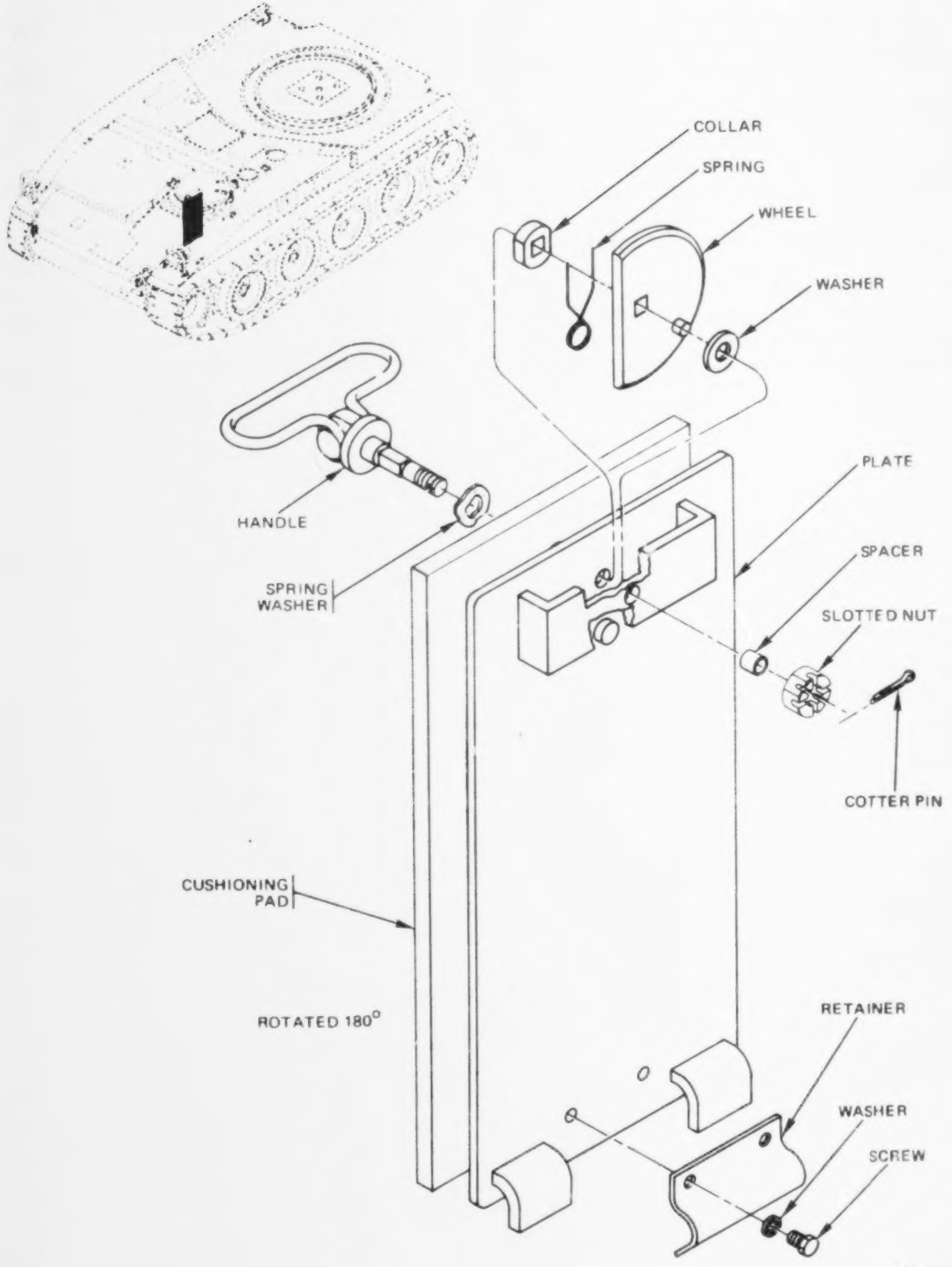

COLLAR
SPRING
WHEEL
WASHER
HANDLE
PLATE
SPRING WASHER
SPACER
SLOTTED NUT
COTTER PIN
CUSHIONING PAD
ROTATED 180°
RETAINER
WASHER
SCREW
AT 46397

Figure 17-5. Fuel filter access door disassembly or assembly.

d. Repair.

(1) Smooth sharp edges with a fine mill file.

(2) Weld small cracks or breaks in plate.

(3) Replace defective parts with new serviceable parts.

(4) Sand down paint damaged areas and touch-up, using enamel to match existing color (white enamel, federal specification TT-E-489). Apply one coat of primer (MIL-P-8585) to aluminum alloys, or rust inhibitor primer (TT-P-659) to carbon steel. Allow primer to dry for a minimum of 30 minutes before applying enamel.

e. Fuel Filter Access Door Assembly (fig. 17-5). Assemble fuel filter access door in the reverse order of disassembly. Bond cushioning pad to plate, if removed, using Adhesive Rubber Type II, specification MMM-A-1617.

17-8. Engine Deck Assembly Repair

a. Engine Deck Assembly Disassembly (fig. 17-6).

(1) Remove one spring from access door.

(2) Remove twelve screws, twelve lock washers and twelve nuts attaching a hinge to door and deck.

(3) Remove door from deck and hinge from door.

(4) Remove pin from hinge.

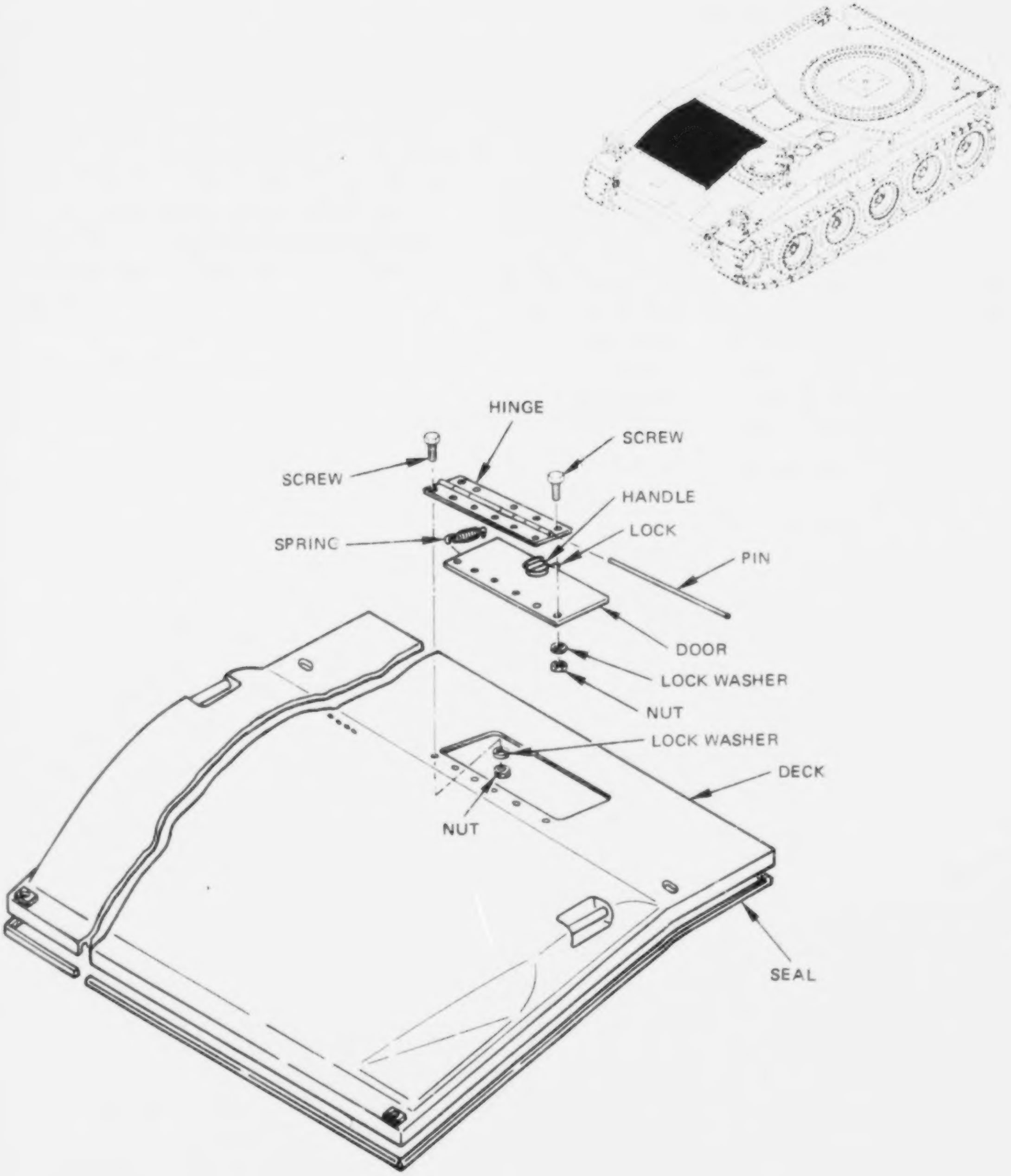
(5) Remove seal from deck, if worn or damaged, using scraper to separate seal from bonding adhesive.

b. Cleaning.

(1) Clean parts with dry-cleaning solvent (SD-2).

(2) Clean adhesive bonding from deck and door, if seal was removed, using dry-cleaning solvent (SD-2), scraper and crocus cloth.

(3) Dry clean parts with low pressure compressed air.


HINGE
SCREW
SCREW
HANDLE
SPRING
LOCK
PIN
DOOR
LOCK WASHER
NUT
LOCK WASHER
DECK
NUT
SEAL

TA 011826

Figure 17-6. Engine deck assembly disassembly or assembly.

c. Inspection.

(1) Inspect for physical damage, breaks, cracks, sharp ragged edges, deformation, rust and paint damage.

(2) Inspect attaching hardware for damage.

d. Repair.

(1) Smooth sharp edges with a fine mill file.

(2) Weld small breaks or cracks in plate.

(3) Replace defective parts with new serviceable parts.

(4) Sand down paint damaged areas and touch-up, using enamel to match existing color (white enamel, federal specification TT-E-489; olive drab enamel, federal specification TT-E-529). Apply one coat of primer (MIL-P-8585) to aluminum alloys or rust inhibitor primer (TT-P-659) to carbon steel. Allow primer to dry for a minimum of 30 minutes before applying enamel.

e. Engine Deck Assembly, Assembly (fig. 17-6). Assemble engine deck assembly in the reverse order of disassembly. Bond seal to deck, if removed, using Adhesive Rubber Type II, specification MMM-A-1617.

17-9. Transmission Deck Assembly Repair

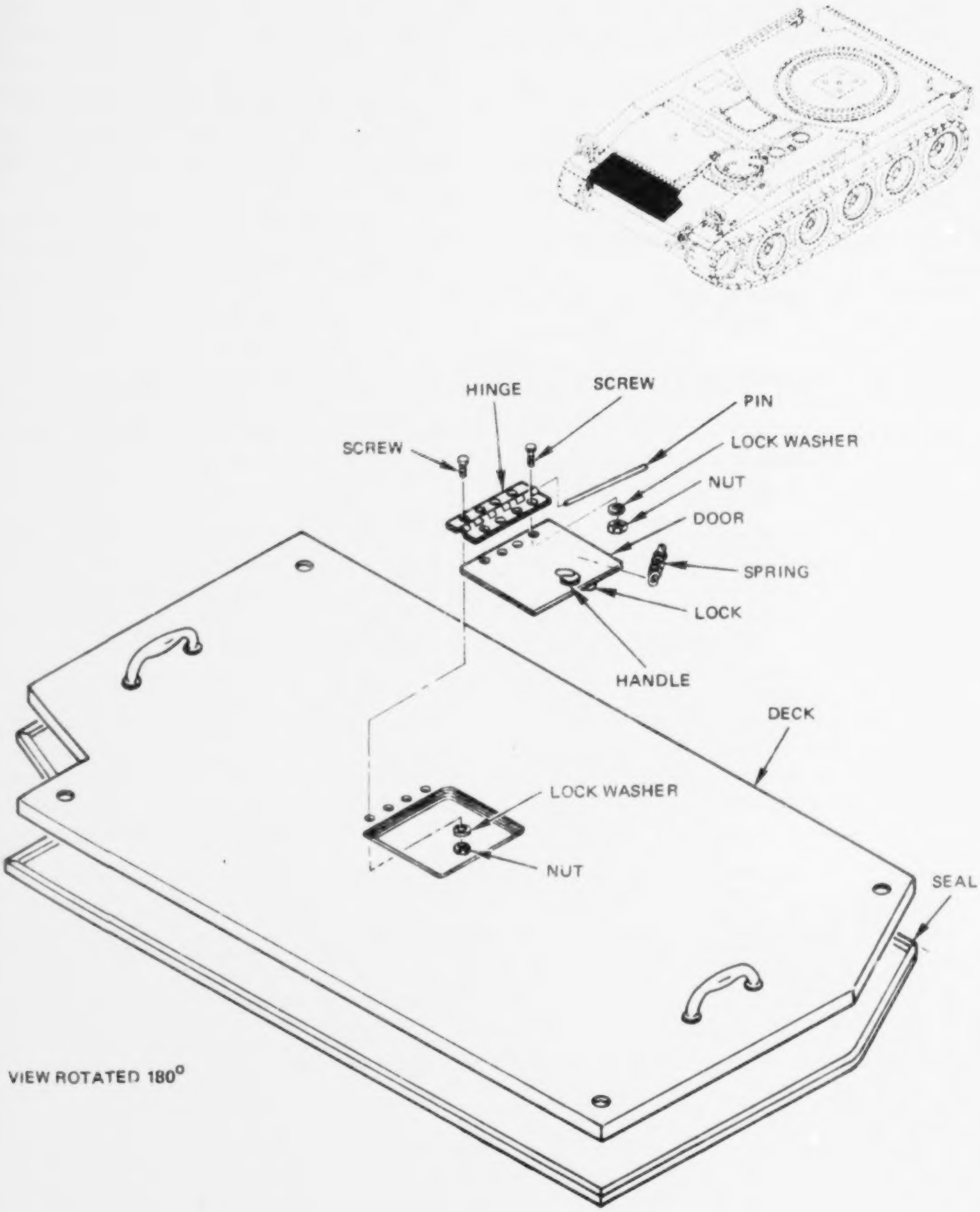
a. Transmission Deck Assembly, Disassembly (fig 17-7).

(1) Remove four screws, four nuts, four washers and access door from deck.

(2) Remove one spring from access door.

(3) Remove four screws, four washers and four nuts attaching hinge to deck and door. Remove hinge pin from hinge.

(4) Remove seals from door and deck, if worn or damaged, using scraper to separate seal from bonding adhesive.


HINGE
SCREW
PIN
SCREW
LOCK WASHER
NUT
DOOR
SPRING
LOCK
HANDLE
DECK
LOCK WASHER
NUT
SEAL

VIEW ROTATED 180°

TA 011827

Figure 17-7. Transmission deck assembly disassembly or assembly.

b. Cleaning.

(1) Clean parts with dry-cleaning solvent (SD-2).

(2) Clean adhesive bonding from deck, if seal was removed, using dry-cleaning solvent (SD-2), scraper and crocus cloth.

(3) Dry clean parts with low pressure compressed air.

c. Inspection.

(1) Inspect for physical damage, breaks, cracks, sharp ragged edges, deformation, rust and paint damage.

(2) Inspect attaching hardware for damage.

d. Repair.

(1) Smooth sharp edges with a fine mill file.

(2) Weld small cracks and breaks in plate.

(3) Replace defective parts with new serviceable parts.

(4) Sand down paint damaged areas and touch-up, using enamel to match existing color (white enamel, federal specification TT-E-489; olive drab enamel, federal specification TT-E-529). Apply one coat of primer (MIL-P-8585) to aluminum alloys or rust inhibitor primer (TT-P-659) to carbon steel. Allow primer to dry for a minimum of 30 minutes before applying enamel.

e. Transmission Deck Assembly, Assembly (fig 17-7). Assemble transmission deck assembly in the reverse order of disassembly. Bond seal to deck, if seal was removed, using Adhesive Rubber Type III, specification MMM-A-1617.

Section III. MISCELLANEOUS COVERS, PLATES, TRAYS AND BRACKETS

17-10. General

For information on disassembly, cleaning, inspection, repair and assembly of covers, plates, trays and brackets not covered in the chapter, refer to TM 9-2300-216-20.

CHAPTER 18
SPADE REPAIR

Section I. DESCRIPTION AND DATA

18-1. Description and Operation

The spade is a hydraulically operated device attached to the rear of the hull to stabilize the firing platform. The spade installation consists of a spade assembly attached to the vehicle hull by two pins. Two double-acting hydraulic spade cylinders are mounted to the spade and hull to provide lifting and lowering capability. The spade hydraulic cylinders are of the single-piston, double-acting type. Valving to apply pressure to one side of the piston and release hydraulic pressure on the other side of the piston is accomplished by the spade control valve on the rear left side of the vehicle. When the spade is lowered (i.e., by operation of the spade control) and the vehicle is driven backwards, the spade is designed to dig into the ground to build a mound of earth. The vehicle is driven backwards to firmly implant the spade into the mound. When the spade is to be raised, the driver moves the vehicle forward while rotating the spade control handle to the RAISE position, allowing the spade to be raised. A lock is incorporated in each cylinder to lock the spade in the raised position.

18-2. Data.

Spade:

Military number	10892061

Section II. SPADE REPAIR

18-3. General

For information on removal, disassembly, cleaning, inspection, repair and assembly of the spade, refer to TM 9-2300-216-20. Replace all parts that are worn beyond limits specified in repair standards table 18-1.

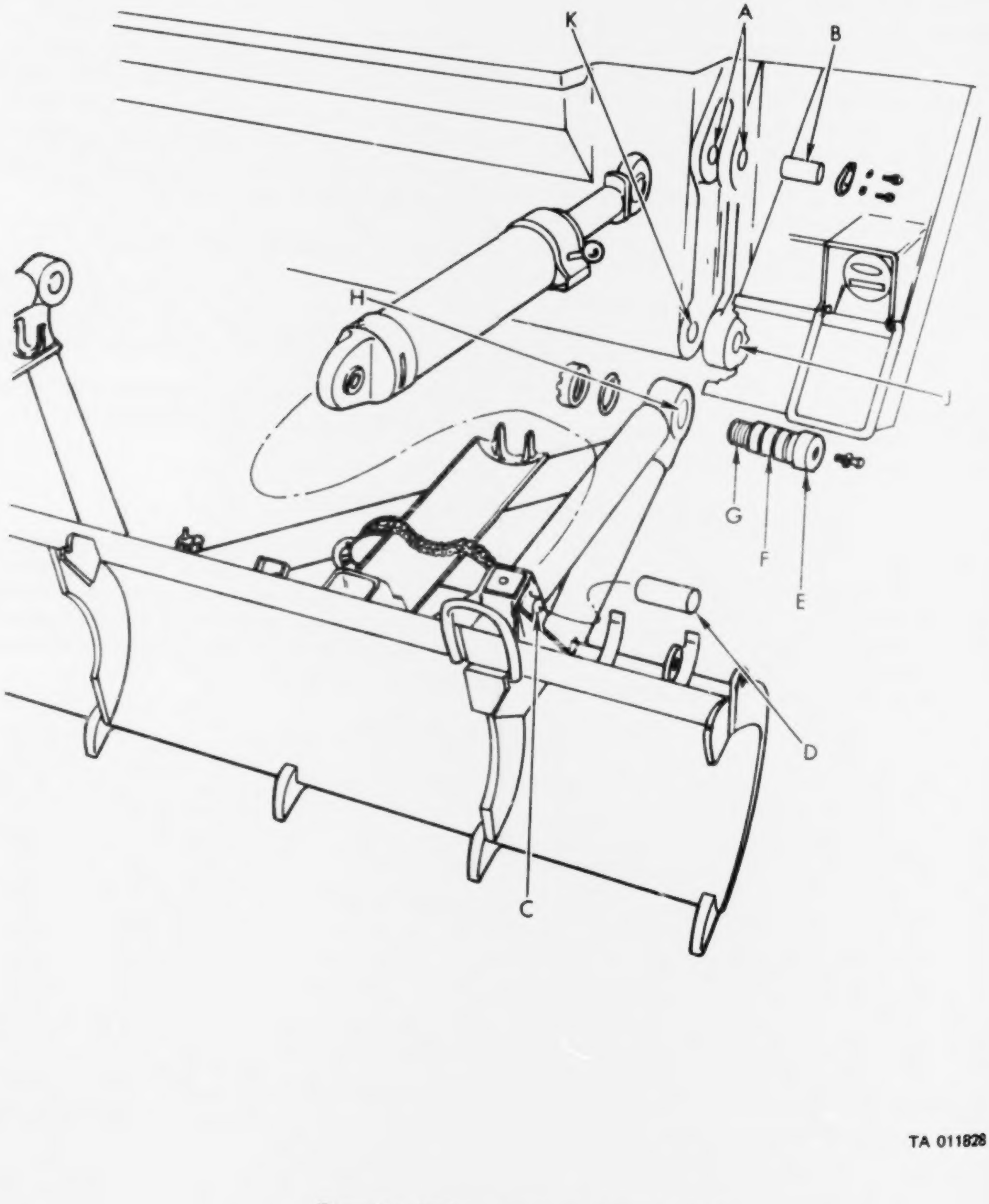
Section III. SPADE REPAIR STANDARDS

18-4. General

Repair standards for the spade are listed in table 18-1 and illustrated in figure 18-1. The reference letters on the illustration are shown in the second column of the table. Each item in the table indicates the point of measurement, or inspection, part name, size and fit of new part, wear limits and code symbols to coordinate information. Wear limits indicate the point to which a part, or parts, may be worn before replacement in order to obtain maximum service with minimum replacement. The suffix letter L indicates loose or clearance fit between two parts.

Table 18-1. Spade Repair Standards

Fig no.	Ref letter	Point of measurement	Size and fit of new parts	Wear limits
18-1	A	ID of spade cylinder anchor on hull	2.0010 to 2.0040	2.012
18-1	B	OD of spade cylinder pin (in hull) 10892477	1.9969 to 1.9990	1.9885
18-1	A-B	Fit of spade cylinder pin to spade cylinder anchor in hull	0.002L to 0.008L	0.0235L
18-1	C	ID of spade cylinder anchor pin hole in spade	2.001 to 2.004	2.012
18-1	D	OD of spade cylinder anchor pin 10892478	1.996 to 1.999	1.9885
18-1	D-C	Fit of spade cylinder anchor pin to cylinder anchor pin hole in spade	0.002L to 0.008L	0.0235L
18-1	E	OD of spade hinge pin outboard	3.497 to 3.500	3.491
18-1	F	OD of spade hinge pin center	2.749 to 2.750	2.743
18-1	G	OD of spade hinge pin inboard	2.617 to 2.620	2.611
18-1	H	ID of spade cylinder-to-spade pin hole in spade	2.770 to 2.780	2.790
18-1	J	ID of spade cylinder-to-spade pin hole in hull - outboard	3.505 to 3.510	3.520
18-1	E-J	Fit of spade cylinder-to-spade pin to spade cylinder-to-spade pin hole in hull	0.005L to 0.013L	0.029L
18-1	F-H	Fit of spade cylinder-to-spade pin to spade cylinder-to-spade pin hole in spade	0.020L to 0.031L	0.047L
18-1	K	ID of spade cylinder-to-spade pin hole in hull — inboard	2.625 to 2.630	2.640
18-1	G-K	Fit of spade cylinder-to-spade pin to spade cylinder-to-spade pin hole in hull — inboard	0.005L to 0.013L	0.029L


K
A
B
H
J
G
F
E
D
C

TA 011828

Figure 18-1. Spade measurement and inspection points.

CHAPTER 19
FABRIC FUEL CELL REPAIR ("B" VEHICLES)

Section I. DESCRIPTION AND DATA

19-1. General

The hull fuel cell is an integral part of the hull weldment and cannot be removed. The fuel cell is divided into right and left compartments that are connected with a vent tube at the top and a cell interconnect at the bottom. The fabric fuel cells are nylon fabric coated with an inner layer of Buna-N and outer layers of neoprene and polyurethane. Fabric fuel cells are installed as liners in the hull compartments and are filled with foam filler blocks. The right fabric fuel cell is filled with 12 filler blocks and the left fabric fuel cell is filled with 13 filler blocks.

Section II. FABRIC FUEL CELL REPAIR

19-2. General

This section contains information for the cleaning, inspection, and repair of the fabric fuel cells.

19-3. Fabric Fuel Cell Repair

a. Cleaning.

(1) Use putty knife or scraper and remove all sealant from both fabric fuel cells at hull contact points. Remove sealing compound from all securing screws. Use dull tap and clean all threaded holes in both fuel cells of sealant and sealing compounds.

(2) Use putty knife or scraper and remove all sealer from hull at fabric fuel cell contact points. Use dull tap and clean threaded holes at fuel filler access of sealant and sealing compound.

(3) Hull fuel cell should be cleaned (para 22-3*b*), inspected (para 22-4) and repaired (para 22-5), if required.

b. Inspection. Inspect right and left fabric fuel cell, inside and outside, for cracks, tears or deterioration. Check all fabric fuel cell mounting rings for cracks or stripped threads in tapped holes. Replace fabric fuel cell, if defective. Inspect filler blocks for tears, deterioration and contaminants. Replace filler blocks if damaged or excessively dirty. Check threads of all mounting hardware and replace as required.

c. Repair. Repair of the fabric fuel cells is limited to replacement of defective parts. The right fabric fuel cell replacement is repair kit 5705018. The left fabric fuel cell replacement is repair kit 5705019. Refer to TM 9-2300-216-34P-1 for all other replacement parts.

CHAPTER 20
HULL MISCELLANEOUS COMPONENTS REPAIR

Section I. DESCRIPTION AND DATA

20-1. Description

The hull miscellaneous components consist of the hull drain valves, fender extensions, fender extension steps, headlamp guard, mud guard, towing pintle and tow hooks.

20-2. Data

Drain Valves:	
Military number	MS51345-2
Fender Extension, Left Front:	
Military number	10934546-1
Fender Extension, Right Front:	
Military number	10934546-2
Headlamp Guard:	
Military number	10892327
Fender Extension Step:	
Military number	10902472
Mud Guard:	
Military number	10904512
Towing Pintle:	
Military number	8710630
Tow Hook:	
Military number	7068219

Section II. HULL MISCELLANEOUS COMPONENTS REPAIR

20-3. General

For information on removal, disassembly, cleaning, inspection, repair, assembly and installation of the hull miscellaneous components, refer to TM 9-2300-216-20.

CHAPTER 21
FIXED FIRE EXTINGUISHER SYSTEM REPAIR

Section I. DESCRIPTION AND DATA

21-1 Description and Operation

The fixed fire extinguisher system is a CO_2 type, provided to protect equipment in the engine compartment in the event of an internal fire. The system consists of two 10-pound CO_2 cylinders, a control head, two strategically positioned discharge nozzles, associated tubes and fittings, an internal control handle in the driver's compartment and an external handle located just below the auxiliary (slave) receptacle. The fixed fire extinguisher system is operated by pulling either the internal or external control handle which will fully discharge both CO_2 cylinders simultaneously.

21-2. Data

Fixed Fire Extinguisher System:	
Type	CO_2
Cylinders:	
Quantity	2
Capacity (each)	10 pounds
Discharge Nozzles:	
Quantity	2
Location	Engine compartment
Release Handles:	
Internal (one)	Driver's compartment
External (one)	Below slave receptacle

Section II. FIXED FIRE EXTINGUISHER SYSTEM REPAIR

21-3. General

For instructions on disassembly, cleaning, inspection, repair, assembly, testing and adjustment of the fixed fire extinguisher system, refer to TM 9-2300-216-20.

CHAPTER 22
HULL REPAIR

Section I. DESCRIPTION AND DATA

22-1. Description

The hull is a steel weldment reinforced with stiffeners for rigidity. Five road wheel arm supports are welded to each side of the hull. A mount in the front of the hull provides support for the final drives. A turret bearing support is welded on the hull centerline in the top aft section of the hull. Mounting pads and brackets are provided for mounting of the engine, transmission and auxiliary equipment. Drilled and tapped cutouts are provided in the hull to receive hull covers, access plates, drains and plugs. The driver's cupola ring, welded into the top left front of the hull is armor plate steel. A fuel cell is an integral part of the hull.

Section II. HULL REPAIR

22-2. General

This section provides information for cleaning, inspection and repair of the hull structure.

22-3. Cleaning

a. Hull Structure Cleaning.

(1) Steam clean exterior and interior of hull to remove grease and dirt film.

(2) Make sure that road wheel arm support interiors are thoroughly cleaned.

WARNING

Do not direct compressed air toward the body when drying hull. Operator shall wear cup-type goggles when drying with compressed air.

(3) Dry clean surfaces of hull immediately after cleaning, using clean dry compressed air.

(4) Inspect hull structure after drying to make sure surfaces are clean, dry and free of foreign matter.

b. Hull Fuel Cell Cleaning.

The following cleaning method is for the hull weldment fuel compartment. It can be used on "B" vehicles only after the fabric fuel cells have been removed.

WARNING

Do not enter fuel cell until it has been drained and thoroughly cleaned. Prolonged breathing of vapors can be fatal.

WARNING

Tanks which are not entirely free of flammable liquid, vapor or gases, must not be welded or exposed to heat, flame or sparks. The use of equipment that may produce sparks, such as power sanders, chisels and chipping hammers is prohibited. Welding or other work producing heat, flame or sparks shall be preceded by cleaning.

CAUTION

Do not steam clean fabric fuel cells. Refer to para 4-74 for fabric fuel cell cleaning and removal procedures ("B" vehicles).

(1) *Materials needed.*

(*a*) Adequate source of steam with a hose long enough to reach vehicle top deck and a control nozzle with an extension pipe to reach two-thirds depth of fuel cell.

(*b*) Compressed air source and air hose with blow-gun nozzle.

(*c*) Suitable size container (360 gallons) for mixing cleaning and inhibitor solutions.

(*d*) Adequate supply of cleaning compound specification MIL-C-10597B.

(2) *Procedure.*

(*a*) Drain fuel cell. Remove drain plug in bottom of fuel cell to drain ("A" vehicles). Remove fabric fuel cells by following procedure in para 4-74 ("B" vehicles).

(*b*) Remove access plate from left top of fuel cell. Remove fuel filler and filler strainer from right top of deck ("A" vehicles).

(*c*) Place steam jet in openings and heat fuel cell with steam only.

(*d*) While fuel cell is heating, mix cleaning solution as follows:

1. Put approximately 235 gallons water in container.

2. Mix powdered cleaning compound specification MIL-C-10597B (ORD) into water. Use one container for each 10 gallons of water for lightly rusted or corroded inner surfaces or one container for each 6 gallons of water for more severe rusting. Set aside bottle of liquid packed in larger compartment.

(*e*) Remove steam jet from fuel cell and let cell drain. Install drain plug.

(*f*) Make sure powder is completely dissolved and pour cleaning mixture into fuel cell.

(*g*) Insert steam jet into solution. When cleaning solution becomes 160° F to 180° F add liquid from bottles set aside in (*d*)*2*, above. Continue heating with steam jet until cleaning solution boils.

(*h*) Continue boiling action of cleaning solution for 90 minutes or until inspection reveals that derusting has been accomplished (*i*) Drain cleaning solution from fuel cell leaving steam jet in place to keep cell hot.

(*j*) Mix inhibitor powder, contained in small compartment of each cleaning compound container used, into 350 gallons of water.

(*k*) Install drain plug in bottom of fuel cell. Remove steam jet and pour inhibitor into hot fuel cell. Insert steam jet and heat and agitate solution for approximately 15 minutes.

(*l*) Remove drain plug and drain inhibiting solution from fuel cell and flush cell with clean water until water comes out clear.

(*m*) Place steam jet in drained fuel cell and steam until cell is very hot.

(*n*) Remove steam jet and dry fuel cell interior with compressed air and air blow gun.

22-4. Inspection

a. Inspect hull plates and stringers for cracks, breaks or deformation.

b. Inspect all mounts and pads for structural integrity.

c. Inspect all threaded mounting holes for worn or damaged threads.

d. Inspect turret ring for cracks, breaks or corrosion.

e. Inspect welded seams and joints for breaks, cracks or separation.

f. Inspect all machined surfaces for pitting, scoring, breaks or cracks.

g. Inspect hull openings for sharp ragged edges.

h. Inspect interior and exterior painted surfaces for damage.

22-5. Repair

a. Weld small cracks and breaks (TM 9-237).

b. Repair thread damaged mounting holes with dull die or install thread inserts.

c. Remove all sharp ragged edges with a fine mill file.

d. Repair defective welds by chipping out old weld and rewelding.

e. Sand down paint damaged areas and touch-up using enamel to match existing color (white enamel, federal specificaiton TT-E-489; olive drab enamel, federal specification TT-E-529). Apply one coat of rust inhibitor primer (TT-P-659), allowing primer to dry for a minimum of 30 minutes before applying enamel.

CHAPTER 23
SPECIAL PURPOSE KITS INSTALLATION

Section I. DESCRIPTION AND DATA

23-1. General

This chapter contains description, maintenance and detailed procedures for the initial installation, inspection, removal, repair and packaging of special purpose kits.

23-2. Description

a. *Driver's Heater Kit.* The driver's heater kit consists of the heater switch, heater assembly, deflector assembly, heater hoses, and related attaching parts, fittings, and brackets. The heater is mounted in the forward area of the driver's compartment, and is connected to the engine coolant system by hoses. Engine coolant is supplied from the engine block to the heater assembly for operation. For operating procedures refer to TM 9-2300-216-10.

b. *Crew Shelter Kit.* The crew shelter kit consists of a crew compartment cover, a shroud assembly, a cover framework that includes a floor, three dome lights and required connections, brackets and wiring. The shelter is installed on the turret to provide protection to the crew and armament during inclement weather.

c. *Crew Heater Kit.* The crew heater kit consistes of a 60,000 BTU/HR multi-fuel heater, a diffuser and a duct to control the circulation of heated air through the shelter area. It is equipped with a four-gallon fuel tank, is electrically started, and is located on the right side within the shelter area. The crew heater electrical circuit consists of a heater control box, an electric fuel pump, electric harnesses and the electrical components of the crew heater. Operating voltage for the cab heater and fuel pump is supplied from the vehicle batteries through a circuit breaker installed on the electrical accessory panel in the left CO_2 compartment. Exhaust gases are expelled through an exhaust tube through the side of the crew shelter.

d. *Winterization Kit.* The winterization kit is provided for use during extreme cold weather conditions. The winterization kit consists of a driver's enclosure, coolant heater, crew hot-air heater and hot-air ducts, crew shelter covers for the exhaust ports, radiator air intake grille, engine intake air vent, battery air intake ports, and stowage provisions for basic issue items. Refer to TM 9-2300-216-10 for operation procedures.

(1) *Driver's enclosure.* The driver's enclosure fits over the cupola opening to the driver's compartment. It consists of a window, windshield, electric windshield wiper and motor and base with electric leads and attaching parts. The base assembly is mounted over the driver's cupola opening and supports the window and windshield. The electric windshield wiper motor, mounted on the windshield frame, is connected to the vehicle batteries through a circuit breaker located at the back of the friver's compartment.

(2) *Coolant heater.* The coolant heater consists of a 15,000 BTU/hr multi-fuel heater, using vehicle fuel, and includes a pump for circulating the heated engine coolant through the engine block and battery tray. The coolant heater is used as required, primarily during halts or parking, to maintain engine-starting temperature during ambient temperatures of -25° F and below. The coolant heater is mounted on the right side of the hull in place of the hull access cover. The heater electrical circuit consists of a circuit breaker installed on the electric accessories panel in the left CO_2 compartment, a heater control box, an electric fuel pump, and electrical components of the coolant heater. Operating voltage for the coolant heater and associated pump is supplied from the positive post of the vehicle aft battery through a 30-ampere circuit breaker and electric leads to the heater control box. A lead connects the control box to the heater, fuel pump, and coolant pump. The electric fuel pump is connected by a hose to an elbow installed in the right side of the vehicle fuel cell.

(3) *Crew heater.* The crew heater is the same as the crew heater kit described in paragraph *c* above.

(4) *Crew shelter.* The crew shelter is the same as the crew shelter kit described in paragraph *b* above.

(5) *Covers and basic issue items.* Fabric and metal covers are furnished for covering the exhaust ports on the right side forward end of the vehicle, fan well deck opening, battery compartment access door openings, and an insulated cover for the batteries. These covers aid in preventing cold air from entering the engine compartment, and protect the vehicle during parking from driving dust or snow entering the compartment. A metal engine air vent cover replaces the left and right side CO_2 access covers to provide engine aspiration air. Basic issue item brackets and boxes are relocated in the shelter or new provisions are provided.

e. *OVE Rack Kit.* Refer to TM 9-2300-216-34-2 for a detailed description of the OVE rack kit.

f. *Arctic Traction Kit.* This kit consists of insert pads and nuts that replace the track shoe pads for operation in ice/snow environments.

23-3. Data

a. *Driver's Heater.*

National stock number	2540-00-318-0158
Military number	8682953
Manufacturer	Kysor Industrial Corp., Cadillac, Mich.
Output, 180° F water intake, -25° F air intake	23,000 BTU/hr

b. Crew Heater.

National stock number	2540-00-930-8938
Military number	11601809
Manufacturer	Perfection Division, Hupp Corp., Cleveland, Ohio
Manufacturer's model	MF510A
Height	24-1/8 in.
Width	12-3/4 in.
Depth	8 in.
Heater unit weight	31 lb
Type of fuel	Same as vehicle to conform to MIL-G-3056 (Type II, below 0°F) and/or Specification VV-F-800
Fuel Flow:	
High heat	41 to 45 cc/min (at +70° to -65°F)
Low heat	22 to 24 cc/min (at +70° to -65°F)
Heater output:	
High heat	60,000 BTU ± 10%
Low heat	30,000 BTU ± 10%

c. Crew Heater (Optional).

National stock number	2540-00-854-4449
Ordnance number	7748716
Manufacturer	Stewart-Warner Corp., Indianapolis, Ind.
Manufacturer's model	8460-C24
Height	24-1/8 in.
Width	13 in.
Depth	7-59/64 in.
Weight	32-3/4 lb
Output:	
High heat	60,000 BTU/HR
Low heat	30,000 BTU/HR

d. Coolant Heater.

National stock number	2540-00-997-1532
Military number	1160169
Manufacturer	Stewart-Warner Corp., Indianapolis, Ind
Manufacturer's model	939-J24
Length	15-5/16 in.
Width	6-3/16 in.
Height	10-3/4 in.
Weight	15 lb
Output:	
High heat	15,000 BTU/hr
Low heat	8,000 BTU/hr
Temperature settings:	
Overheat switch	245°F
High-low switch	220°F

Section II. PARTS, TOOLS AND EQUIPMENT

23-4. Parts

Maintenance parts for the special purpose kits are listed in Department of the Army Technical Manual TM 9-2300-216-34P-1, which is the authority for requisitioning replacements.

23-5. Tools and Equipment

Standard and commonly used tools and equipment have general application to this material. The only special tool required is a carbon scraper (NSN 5110-00-735-5872) used to remove carbon from the igniter housing of the crew heater.

Section III. MAINTENANCE

23-6. General

For preventive maintenance checks and services and for troubleshooting procedures performed on the special purpose kits, refer to TM 9-2300-216-20.

Section IV. DRIVER'S HEATER KIT

23-7. General

This section contains the instructions for initial installation, inspection, removal and repair of the driver's heater kit. These procedures are also applicable to installation of the driver's heater kit on a vehicle previously equipped with the kit, except for the step requiring the drilling of holes. Part numbers are included in the installation procedures to facilitate identification of components.

23-8 Driver's Heater Kit Installation
(Fig. 23-1)

a. Remove driver's heater kit components from packing box and make sure all parts are available.

b. Use hot airflow control deflector (10881960) as template and drill two 7/32-inch holes, at right angle to centerline of heater assembly, through side of air outlet flange. Install hot air flow control deflector and secure with two machine screws (MS35207-264), two flat washers (MS27183-8) on outside and two lock washers (MS35338-43) and self-locking nuts (MS21044N3) on inside.

c. Install rear mounting bracket (10881973) on rear of heater and secure with two cap screws (MS90726-5), lock washers (MS35338-44) and nuts (MS51968-2).

d. Install front mounting bracket (10881972) on top front of heater and secure with cap screw (MS90726-5), lock washer (MS35338-44) and nut (MS51968-2).

e. Install heater assembly to underside of driver's compartment top hull and secure with five lock washers (MS35338-44) and cap screws (MS90726-3) to tapped mounting pads.

f. Install drain cock to heater hose (11643053-2) on heater upper input tube and secure with hose clamp (MS35842-10).

g. Install hot water return hose (11643053-3) to heater lower output tube and secure with hose clamp (MS35842-10).

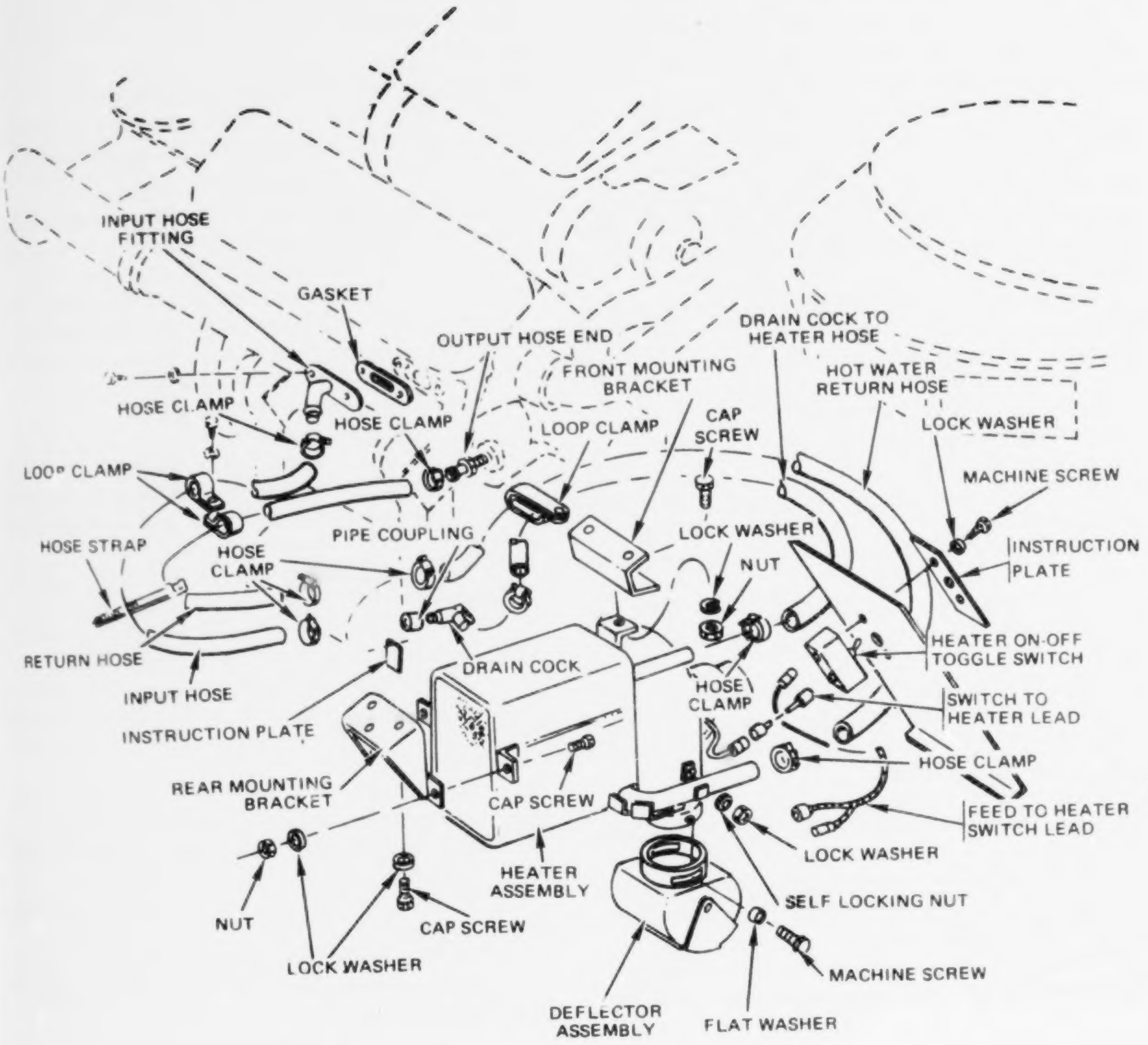

INPUT HOSE FITTING
GASKET
OUTPUT HOSE END
DRAIN COCK TO HEATER HOSE
FRONT MOUNTING BRACKET
HOT WATER RETURN HOSE
HOSE CLAMP
HOSE CLAMP
LOOP CLAMP
CAP SCREW
LOCK WASHER
LOOP CLAMP
MACHINE SCREW
HOSE STRAP
PIPE COUPLING
LOCK WASHER
INSTRUCTION PLATE
HOSE CLAMP
NUT
RETURN HOSE
DRAIN COCK
HEATER ON-OFF TOGGLE SWITCH
INPUT HOSE
HOSE CLAMP
SWITCH TO HEATER LEAD
INSTRUCTION PLATE
HOSE CLAMP
REAR MOUNTING BRACKET
CAP SCREW
FEED TO HEATER SWITCH LEAD
LOCK WASHER
HEATER ASSEMBLY
SELF LOCKING NUT
NUT
CAP SCREW
LOCK WASHER
MACHINE SCREW
DEFLECTOR ASSEMBLY
FLAT WASHER
AT 46405

Figure 23-1. Driver's heater kit installation.

h. Remove dummy caps from two nipples extending through hull at right front of driver's compartment. Install pipe coupling (MS39233-3) to inside left hull nipple. Install heater drain cock (596800) to pipe coupling. Install drain cock-to-heater hose to drain cock and secure with hose clamp (MS35842-10). Install heater hot water return hose on right hull nipple and secure with hose clamp (MS35842-10).

i. Install loop clamp (7763325) on two heater hoses and attach to hull front heater mounting bracket, using bracket attaching screw and lock washer.

j. Install instruction plate (10881968) on hull just below drain cock, using adhesive epoxy.

k. Install heater ON-OFF toggle switch (MS39061-1) and instruction plate (10934544) on instrument switch panel adjacent to IR-RCVR switch and secure with two machine screws (MS35206-245) and lock washers (MS35338-42).

l. Connect switch to heater lead (10934480) to switch lower connector and to heater motor connector. Connect feed to heater switch lead (10934481) to switch top connector. Disconnect light switch lead (circuit 15 & 25) at light switch, and connect feed to heater switch lead to these two connectors.

m. Partially drain engine cooling system (TM 9-2300-216-10). Remove existing plate (GM 5117344) and gasket from right front engine cylinder head. Tag and attach plate and gasket to engine for use when heater kit is removed. Install hose fitting gasket (10881969) and input hose fitting (10881965) on engine cylinder head and secure with existing plate attaching screws and washers.

n. Install heater input hose (11643053-1) between input hose fitting on engine and hull nipple to which heater shut-off cock is installed, and secure with two hose clamps (MS35842-10).

o. Remove existing plug from engine water pump and install heater input hose end (8712438). Tag and attach plug to engine for use when heater kit is removed. Install heater return hose between heater input hose end and hull nipple, and secure with two hose clamps (MS35842-10).

p. Install two loop clamps to transmission, using existing transmission cover screw. Install three retaining hose straps (10921769) around heater hoses to secure.

q. Fill cooling system (TM 9-2300-216-10).

23-9. Inspection After Installation

Make sure drain cock (heater shutoff valve) is completely open. Start and idle engine. Inspect all heater hose connections for leaks and tighten as required. Operate heater ON-OFF switch and make sure heater motor is operating. Open and turn hot air flow control deflector.

23-10. Driver's Heater Kit Removal

Remove driver's heater kit in reverse order of installation. Refer to TM 9-2300-216-20 for procedures.

23-11. Driver's Heater Kit Repair

a. General. Inspect all installation parts of driver's heater kit (fig. 23-1) for serviceability; heater hoses for breaks, cracks, or deterioration; all threaded areas for clean undamaged threads; brackets and clamps free from cracks or dents; and moving parts for freedom of movement. Repair defective parts as required or replace defective parts not repairable.

b. Heater Assembly (8682953) Repair.

(1) *Disassembly* (fig. 23-2).

(*a*) Remove four machine screws and lock washers attaching flange and motor to heater housing and remove motor, motor flange and impeller from heater.

(*b*) Loosen set screw in hub of impeller and pull impeller from motor shaft.

(*c*) Remove two nuts and lock washers attaching motor flange to motor and remove flange from motor.

(*d*) Remove five cap screws and lock washers securing retainer assembly to jacket and pull housing, flange and retainer from jacket. Pull core and tank from jacket.

(*e*) Remove four machine screws and lock washers attaching flange and housing to retainer assembly. Remove housing from retainer assembly and pull flange from housing.

(*f*) Remove machine screw and lock washer and clip from housing.

(*g*) If identification plate is damaged, remove four tapping screws attaching identification plate to jacket and remove plate.

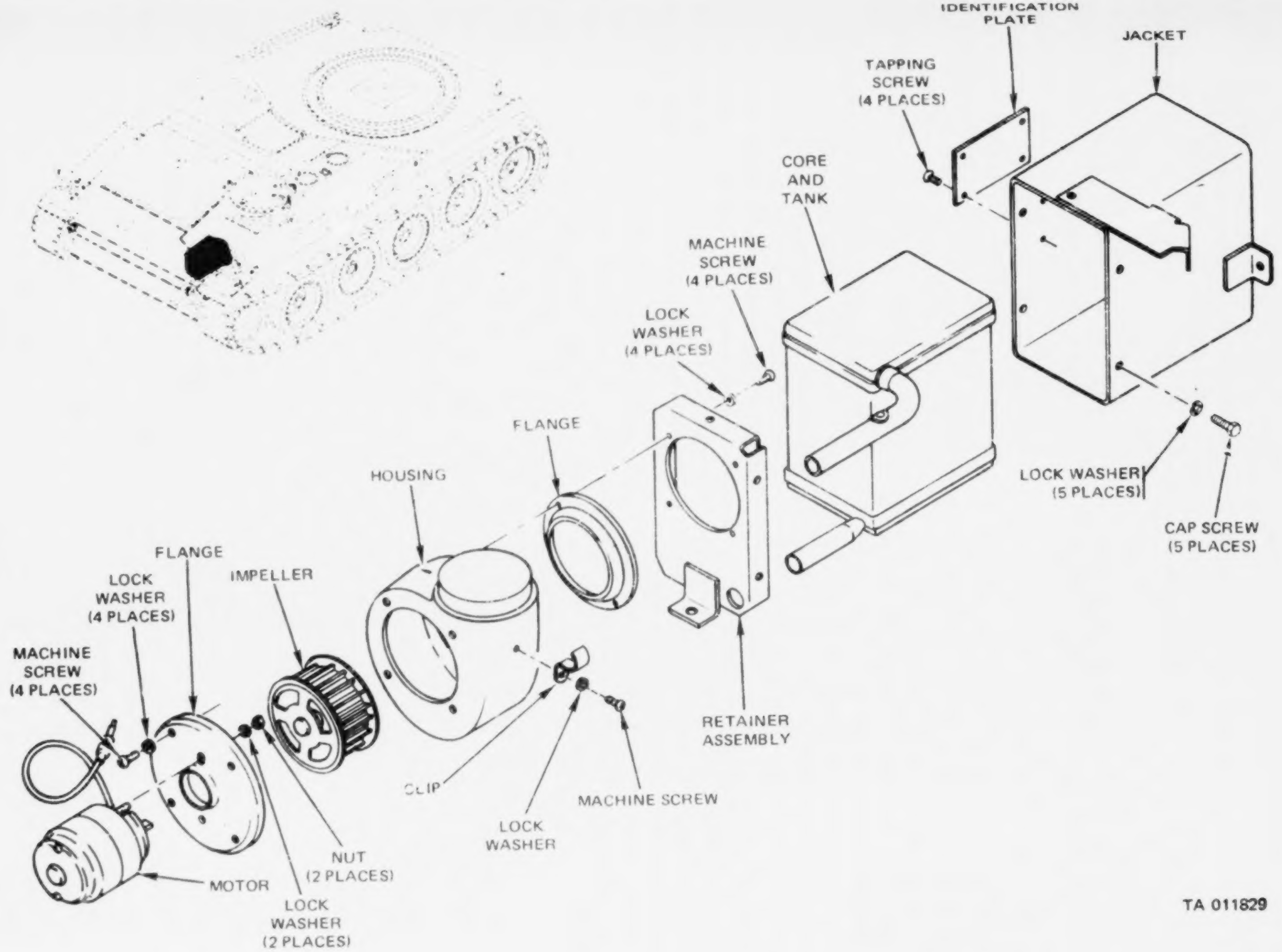

IDENTIFICATION PLATE
JACKET
TAPPING SCREW (4 PLACES)
CORE AND TANK
MACHINE SCREW (4 PLACES)
LOCK WASHER (4 PLACES)
FLANGE
HOUSING
LOCK WASHER (5 PLACES)
CAP SCREW (5 PLACES)
FLANGE
IMPELLER
LOCK WASHER (4 PLACES)
MACHINE SCREW (4 PLACES)
RETAINER ASSEMBLY
CLIP
MACHINE SCREW
LOCK WASHER
NUT (2 PLACES)
MOTOR
LOCK WASHER (2 PLACES)
TA 011829

Figure 23-2. Driver's heater assembly disassembly or assembly.

(2) *Cleaning.*

(*a*) Clean all metal parts with dry-cleaning solvent (SD-2).

(*b*) Dry all metal parts with clean, dry, low-pressure compressed air.

(*c*) Remove rust or corrosion with dry-cleaning solvent (SD-2) and crocus cloth.

(*d*) Use dry pressurized air to clean electric motor.

(3) *Inspection.*

(*a*) Inspect impeller for bent or damaged vanes.

(*b*) Inspect all metal parts for damage or warped condition.

(*c*) Check motor lead for frayed insulation and broken wires.

(*d*) Inspect all threaded areas for clean undamaged condition and for evidence of damaged threads.

(4) *Repair.*

(*a*) File down sharp ragged edges and heavy rusted areas.

(*b*) Sand down chipped, cracked or rusted painted areas. Apply primer and repaint.

(*c*) Straighten deformed parts.

(*d*) Use a thread chaser on damaged threaded areas.

(*e*) Replace defective nonrepairable parts.

(5) *Assembly* (fig. 23-2). Assemble heater assembly in reverse order of disassembly.

c. Deflector Assembly Repair. Repair deflector assembly. Refer to TM 9-2300-216-20 for procedures.

d. Electrical Lead Repair. Repair or replace defective electrical leads. Refer to TM 9-2300-216-20 for procedures.

Section V. CREW SHELTER KIT

23-12. General

This section contains instructions for initial installation, inspection, removal and repair of the crew shelter kit. These procedures are also applicable to installation of the crew shelter kit on a vehicle previously equipped with the kit, except for those steps requiring the drilling of holes. Remove the crew shelter kit components from the packing boxes and make sure all parts are available. Part numbers are included in the installation procedures to facilitate identification of components. For general repair of canvas and webbing, refer to TM 10-269.

23-13. Preparation for Kit Installation

a. General. The following basic issue items stowed on the hull and turret are removed and stored until required for reinstallation after the crew shelter kit is installed: rifles, hand grenades, incendiary grenades, water cans, portable fire extinguisher, water canteens, telephone wire reel and contents of the stowage box. Some vehicular items (fig. 23-2) must be removed, relocated, modified or disposed of and replaced. Table 23-1 lists the items that are removed and returned to supply for disposition. Whenever possible, brackets and securing hardware should be salvaged and reused.

Table 23-1. Items To Be Disposed Of

Part number	Description	Quantity
10881934	Rack, rifle	1
MS51968-8	Nut, hex hd, rifle rack	2
MS90726-58	Capscrew, rifle rack	2
MS90726-57	Capscrew, rifle rack	4
M27183-15	Lock washer, rifle rack	6
MS90726-57	Capscrew, water can bracket	8
MS90726-3	Capscrew, grenade box	8
MS51968-2	Nut, hex hd, grenade box	4
MS90726-57	Capscrew, fire extinguisher bracket	4
10919859	Plate, electrical guard	1
MS90725-57	Capscrew, electrical guard plate	4
MS35338-46	Lockwasher, electrical guard plate	4
MS90726-109	Capscrew, assistant gunner's seat bracket	4
10946771	Back, seat, personnel	1
MS21044N6	Nut, self-locking, seat back support	4
MS90726-60	Capscrew, personnel seat chain	2
MS90726-69	Capscrew, seat back support	2
MS90726-6	Screw, CO_2 access cover plate	3
MS35333-40	Washer, CO_2 access cover plate	3
11642880	Guard, electrical wiring	1
10919747	Seal, rubber, turret	1
10919749	Seal, rubber, turret	1
10919751	Seal, rubber, turret	1
10919752	Seal, rubber, turret	1
10919744	Strip, turret seal	1
10919745	Strip, turret seal	1

Table 23-1. Items To Be Disposed Of — Continued

Part number	Description	Quantity
10919746	Strip, turret seal	1
10919750	Strip, turret seal	1
10919753	Strip, turret seal	1
MS90726-57	Screw, turret seal	42
MS90726-59	Screw, electrical guard	7
MS35338-46	Washer, turret seal	42
MS35338-46	Washer, electrical guard	7

b. Hull Components Removal.

(1) *Rifle rack removal* (fig. 23-3). Remove four cap screws and flat washers attaching rifle rack base to hull and two cap screws, nuts and flat washers attaching rifle rack back to side of hull, and remove rack. Dispose of rack and attaching hardware.

(2) *Water can brackets removal* (fig. 23-3). Remove four cap screws and lock washers attaching each of two water can brackets to hull deck. Remove and save brackets and lock washers. Dispose of cap screws.

(3) *Grenade boxes removal* (fig. 23-3). Remove four cap screws, nuts and washers attaching grenade box to gunner's seat support, and remove grenade box. Remove four cap screws and lock washers attaching grenade box to right front riser of turret, and remove grenade box. Dispose of eight cap screws and four nuts.

(4) *Gunner's seat removal* (fig. 23-3). Remove four cap screws and lock washers attaching gunner's seat support to turret deck and remove gunner's seat and support, with hand grenade box attached. Save seat, support and attaching hardware.

(5) *CO_2 access covers removal* (fig. 23-3). Remove eight cap screws and lock washers attaching each CO_2 access cover to hull, and remove access covers. Dispose of six cap screws and six lock washers. Check the two CO_2 cylinders for full charge and winterize the cylinders in accordance with specification MIL-E-468. Reinstall CO_2 access plates, and omit the three screws and lock washers from the outside forward corner of each access plate.

(6) *Harness protection plate removal* (fig. 23-3). Remove four cap screws and lock washers attaching harness protection plate to forward riser of turret. Dispose of plate and attaching hardware.

(7) *Amplifier and mount bracket removal* (fig. 23-3). Remove four cap screws, lock washers and nuts attaching amplifier mount bracket to assistant gunner's seat bracket, and remove bracket with amplifier attached. Position and secure bracket and amplifier over trunnion into turret well.

NOTE

Do not disconnect harnesses from amplifier.

(8) *Assistant gunner's seat and bracket removal* (fig. 23-3). Remove four cap screws and lock washers attaching assistant gunner's seat bracket to turret and remove seat and bracket. Dispose of four cap screws.

(9) *Fire extinguisher bracket removal* (fig. 23-3). Remove four cap screws and lock washers attaching portable fire extinguisher bracket to forward riser of turret and remove bracket. Dispose of bracket and attaching hardware.

(10) *Personnel seat removal* (fig. 23-3). Remove two self-locking nuts and two cap screws securing chain to seat back. Remove two self-locking nuts and cap screws attaching seat to seat back, and remove seat. Remove two self-locking nuts and cap screws attaching seat back posts to deck and lift seat back free of hull. Dispose of seat back, two self-locking nuts and two cap screws removed from seat back posts.

(11) *Interphone reel bracket removal* (fig. 23-3). Remove four cap screws and lock washers attaching bracket to rear of hull. Save bracket and attaching hardware.

(12) *Interphone control removal* (fig. 23-3). Remove four screws and lock washers attaching interphone control to right trunnion. Position and secure interphone control and harness over trunnion into turret well.

NOTE

Do not disconnect harnesses from control.

(13) *Hydraulic tubes removal* (fig. 23-3). Relieve all hydraulic pressure (TM 9-2300-216-20.) Remove filter manifold-to-handpump tube and handpump-to-deck tube from hydraulic handpump. Remove hydraulic elbow from bottom of handpump. Save tubes and elbow. Cap all hydraulic lines and openings to prevent contamination of hydraulic system.

(14) *Harness guard removal* (fig. 23-3). Remove three screws and lock washers attaching harness to rear of right trunnion and remove guard. Save guard and attaching hardware. Lift harnesses up on trunnion as far as possible and secure with tape.

(15) *Right tube guard removal* (fig. 23-3). Remove four cap screws and five washers attaching right tube guard to turret deck and trunnion. Save guard and attaching hardware.

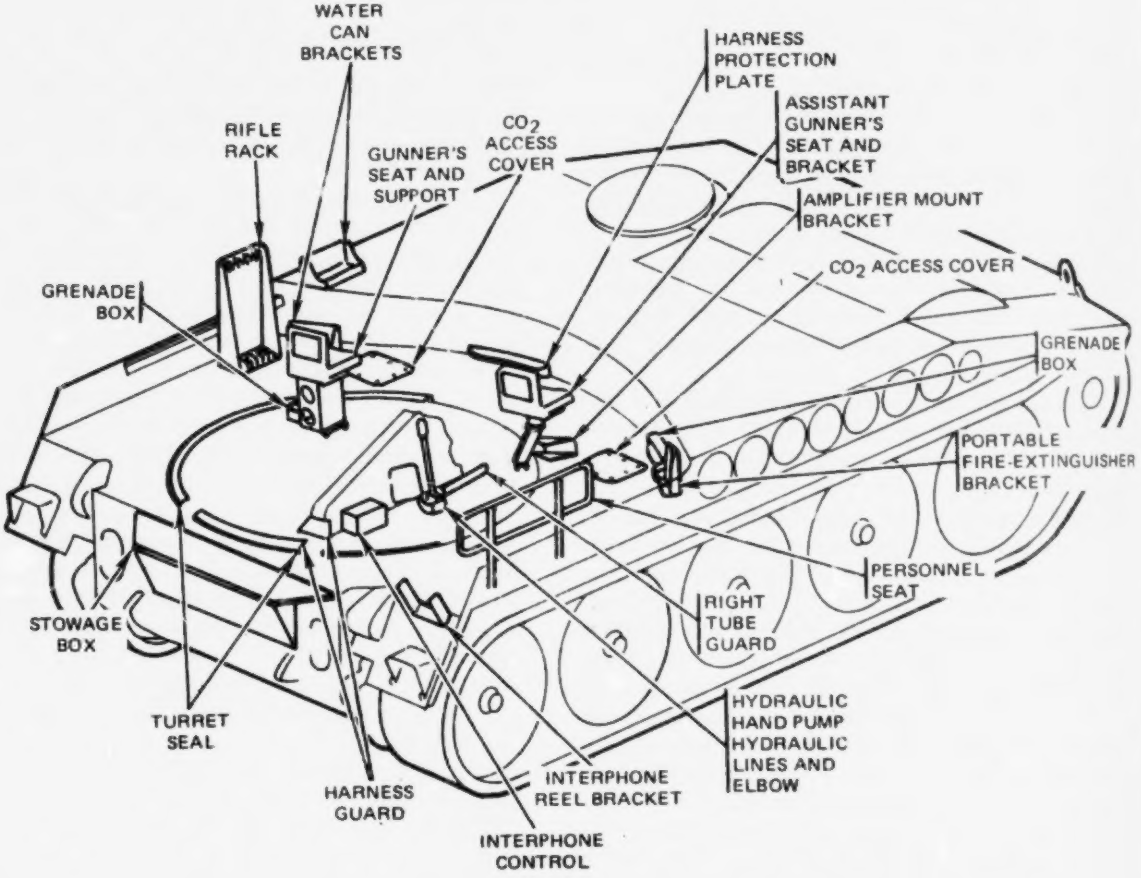
(16) *Turret seals and harness guard removal* (fig. 23-3). Remove 42 screws and lock washers attaching harness guard, seal strips and seals to outer circumference of turret, and remove guard, strips and seals. Dispose of guard, strips, seals and attaching hardware.

(17) *Stowage box removal, modification and installation* (figs. 23-3 and 23-4).

(*a*) Remove four cap screws and lock washers attaching stowage box to rear of hull.

(*b*) Slot four mounting screw holes in rear of stowage box 1 inch long by 7/16 inch wide. Spot face a 1-inch-diameter cutout in continuous hinge at two top mounting holes (fig. 23-4).

(*c*) Reinstall stowage box on rear of hull. Make sure top of stowage box is below surface of turret deck.


WATER CAN BRACKETS
HARNESS PROTECTION PLATE
ASSISTANT GUNNER'S SEAT AND BRACKET
RIFLE RACK
GUNNER'S SEAT AND SUPPORT
CO2 ACCESS COVER
AMPLIFIER MOUNT BRACKET
CO2 ACCESS COVER
GRENADE BOX
GRENADE BOX
PORTABLE FIRE-EXTINGUISHER BRACKET
PERSONNEL SEAT
RIGHT TUBE GUARD
STOWAGE BOX
TURRET SEAL
HYDRAULIC HAND PUMP HYDRAULIC LINES AND ELBOW
INTERPHONE REEL BRACKET
HARNESS GUARD
INTERPHONE CONTROL

TA 011830

Figure 23-3. Items to be removed prior to installation of crew shelter kit.

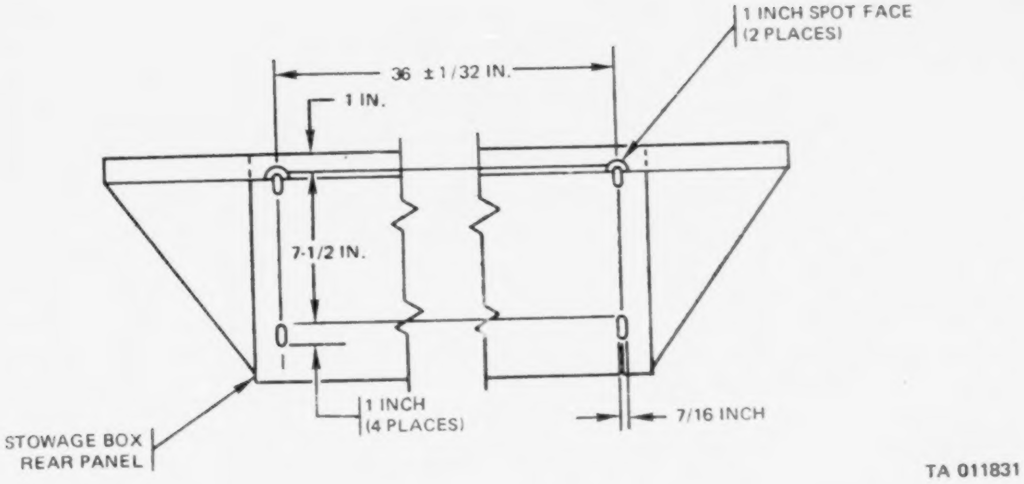


Figure 23-4. Stowage box mounting holes modification.

23-14. Crew Shelter Kit Installation

a. Flanges, Guides, Brackets and Strips Installation (fig. 23-5).

(1) Release travel lock and elevate cannon. Rotate loader and rammer to load position.

CAUTION

When drilling, avoid accidentally drilling into fuel cell.

(2) Use left (10946786-1), center (11643342), and right seal support (10946786-2) flanges as templates to locate, drill and tap nine 0.375-24UNF-2B holes in front riser of turret area (fig. 23-5). Place tops of flanges level with top surface of hull side rails. Top of flanges will be approximately 2.75 inches below top of front deck. Left and right seal support flanges butt against hull side rails.

(3) Secure left, center and right seal support flanges to turret riser with nine cap screws (MS90726-57) and nine lock washers (MS35338-46).

(4) Arrange two top seal support flanges (10946765) so flanges are flush and parallel to outside edges of side rails and against turret riser, or air intake screens in turret riser. Use flanges as templates to locate, drill and tap eighteen 0.250-28UNF-2B holes in left and right seal support flanges and in top of hull side rails. Remove flanges for installation in paragraphs *b* (6) and (10) below.

(5) Use seal guides (10956360-2) as templates to locate, drill and tap six 0.250-2UNF-2B holes in top of each side rail. Locate seal guides as shown on figure 23-6. Temporarily secure guides to side rail with six cap screws (MS90726-3) and six lock washers (MS35338-44). Guide location is adjusted in paragraph *b* (21) below, after floors are installed.

(6) On M107 Gun Vehicles, serial numbers 1 through 252, and on M110 Howitzer Vehicles, serial numbers 1 through 221, plug weld two holes in right side rail and remove two pins welded to turret deck directly under holes used to hold personnel seat.

(7) Use right and left strip brackets (10956358-1) as templates to locate and drill two 0.44-inch-diameter holes through side of each side rail, located as shown on figure 23-6. Secure brackets to side rail with four cap screws (MS90726-59), four lock washers (MS35333-42) and four nuts (MS51968-8) (fig. 23-5).

(8) Install two seal strips (10956319) on the two strip brackets. Secure each strip with three cap screws (MS90726-6), three lock washers (MS35333-40), three flat washers (MS27183-11) and six nuts (MS35691-5) (fig. 23-5).

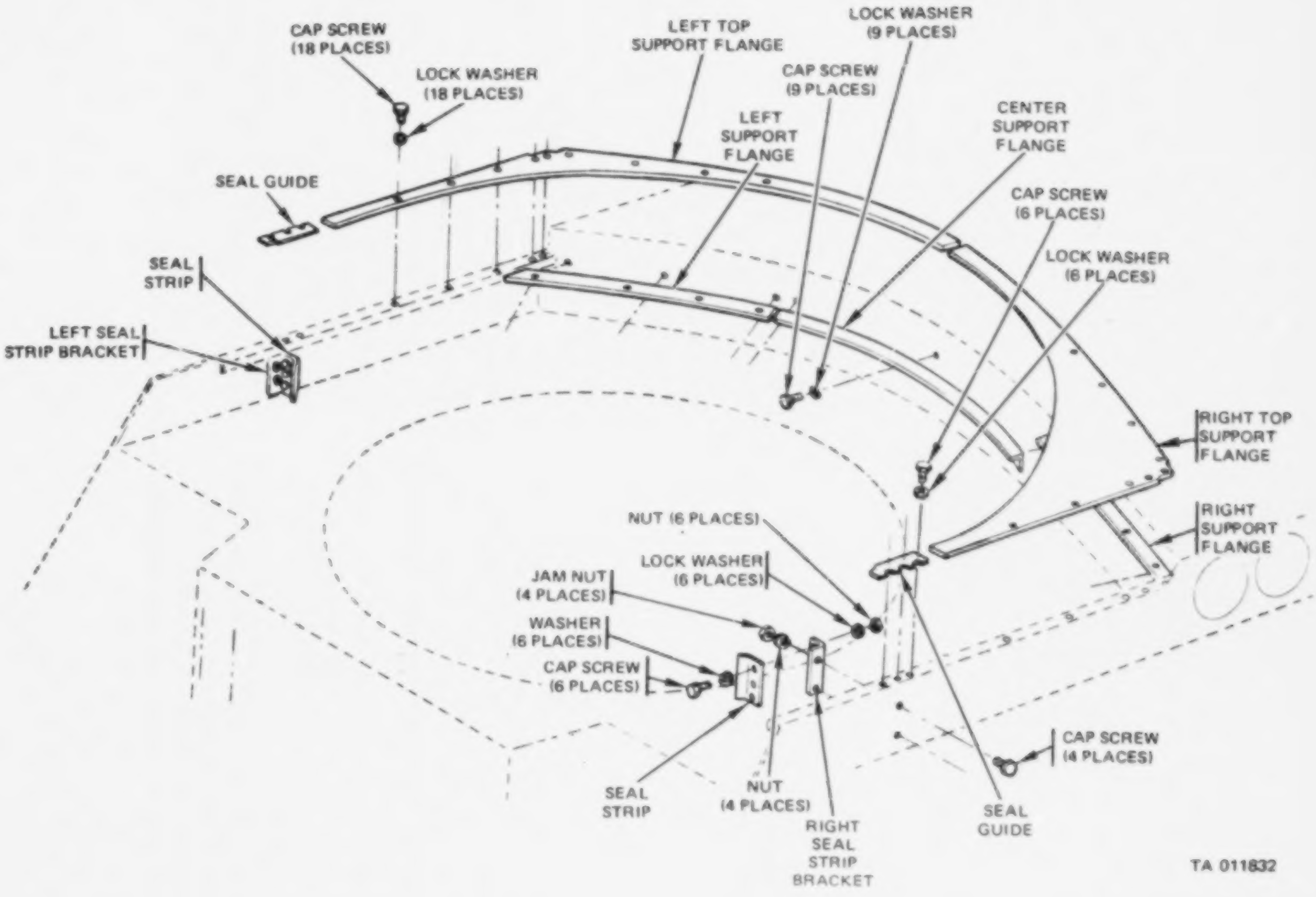
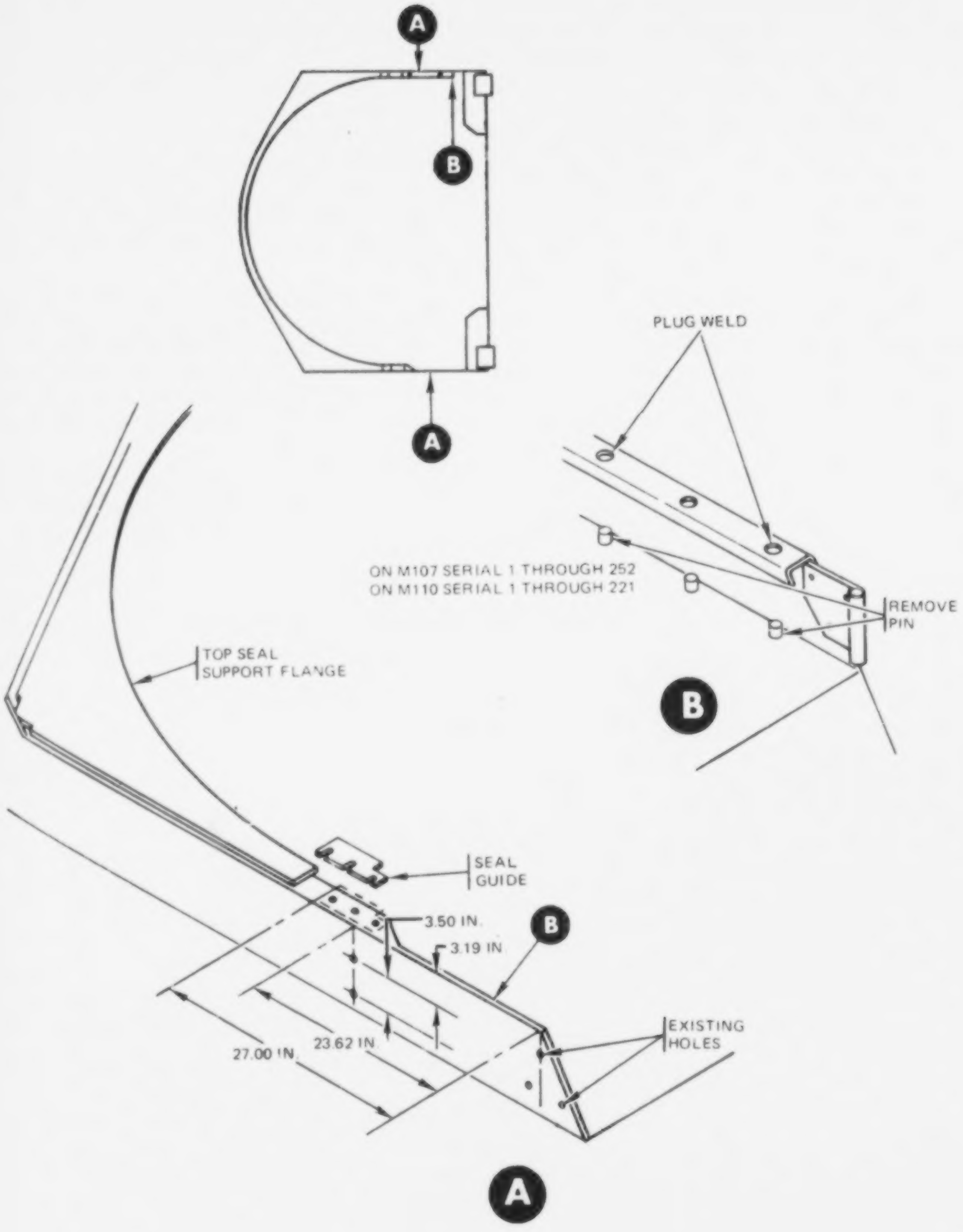

CAP SCREW (18 PLACES)
LOCK WASHER (18 PLACES)
LEFT TOP SUPPORT FLANGE
LOCK WASHER (9 PLACES)
CAP SCREW (9 PLACES)
LEFT SUPPORT FLANGE
CENTER SUPPORT FLANGE
SEAL GUIDE
CAP SCREW (6 PLACES)
LOCK WASHER (6 PLACES)
SEAL STRIP
LEFT SEAL STRIP BRACKET
RIGHT TOP SUPPORT FLANGE
RIGHT SUPPORT FLANGE
NUT (6 PLACES)
LOCK WASHER (6 PLACES)
JAM NUT (4 PLACES)
WASHER (6 PLACES)
CAP SCREW (6 PLACES)
CAP SCREW (4 PLACES)
SEAL STRIP
NUT (4 PLACES)
RIGHT SEAL STRIP BRACKET
SEAL GUIDE
TA 011832

Figure 23-5. Shelter kit turret flanges and related parts installation.


A
B
A
PLUG WELD
ON M107 SERIAL 1 THROUGH 252
ON M110 SERIAL 1 THROUGH 221
REMOVE PIN
B
TOP SEAL SUPPORT FLANGE
SEAL GUIDE
3.50 IN.
3.19 IN.
B
23.62 IN.
27.00 IN.
EXISTING HOLES
A

TA 011833

Figure 23-6. Seal guide and strip bracket mounting holes location.

b. Cab Floor Installation (fig. 23-7).

(1) Install angle seal (10956320) and seal retainer strips (10956316, 10956317 and 10956318) on rear underside of right and left cab floors, and secure seals to each cab floor with 14 screws (MS35191-293), 14 lock washers (MS35333-40) and 14 nuts (MS35691-5).

(2) Install two lower wiper strips (10956321-2) and four lower retainer strips (10956311) to lower outer edge of right and left cab floors. Start installation at rear edge of cab floors. Secure strips to each floor with 10 cap screws (MS90726-6), 10 lock washers (MS35333-40) and 10 nuts (MS35691-5). Install screws from inside floors with nuts and lock washers against retaining strips.

(3) Install one upper wiper strip (10956321-1) and four upper retainer strips (10966311) on upper outer edge of each cab floor. Adjust wiper strips to aline with front edge of floor. Secure strips with 20 cap screws (MS90726-6), 20 lock washers (MS35333-40) and 20 nuts (MS35691-5) on each floor. Install screws from inside floors with nuts and lock washers against retaining strips.

(4) Release travel lock and elevate cannon approximately 40 degrees and traverse it approximately 8 degrees to left. Rotate rammer and loader to load position to facilitate installation of left cab floor.

CAUTION

While moving cab floor into place, do not allow floor edges to scrape or ram hydraulic tubing or electrical harnesses.

(5) Using sling and hoist, position left cab floor on left side of turret. Carefully tilt and lower floor, working rear edge of floor under loader and rammer and front edge around traversing hand crank column (fig. 23-7).

(6) Lift floor slightly and install left top seal support flange (10946765) under upper wiper strip and onto previously installed center and left seal support flanges. Make sure that upper wiper strip is on top of seal support flange and secure flange with nine cap screws (MS90726-5) and nine lock washers (MS35338-42) (fig. 23-7).

(7) Lower floor and position over turret seal tapped holes. Install harness guard (removed in para 23-13*b* (16)) under rear end of floor (fig. 23-3).

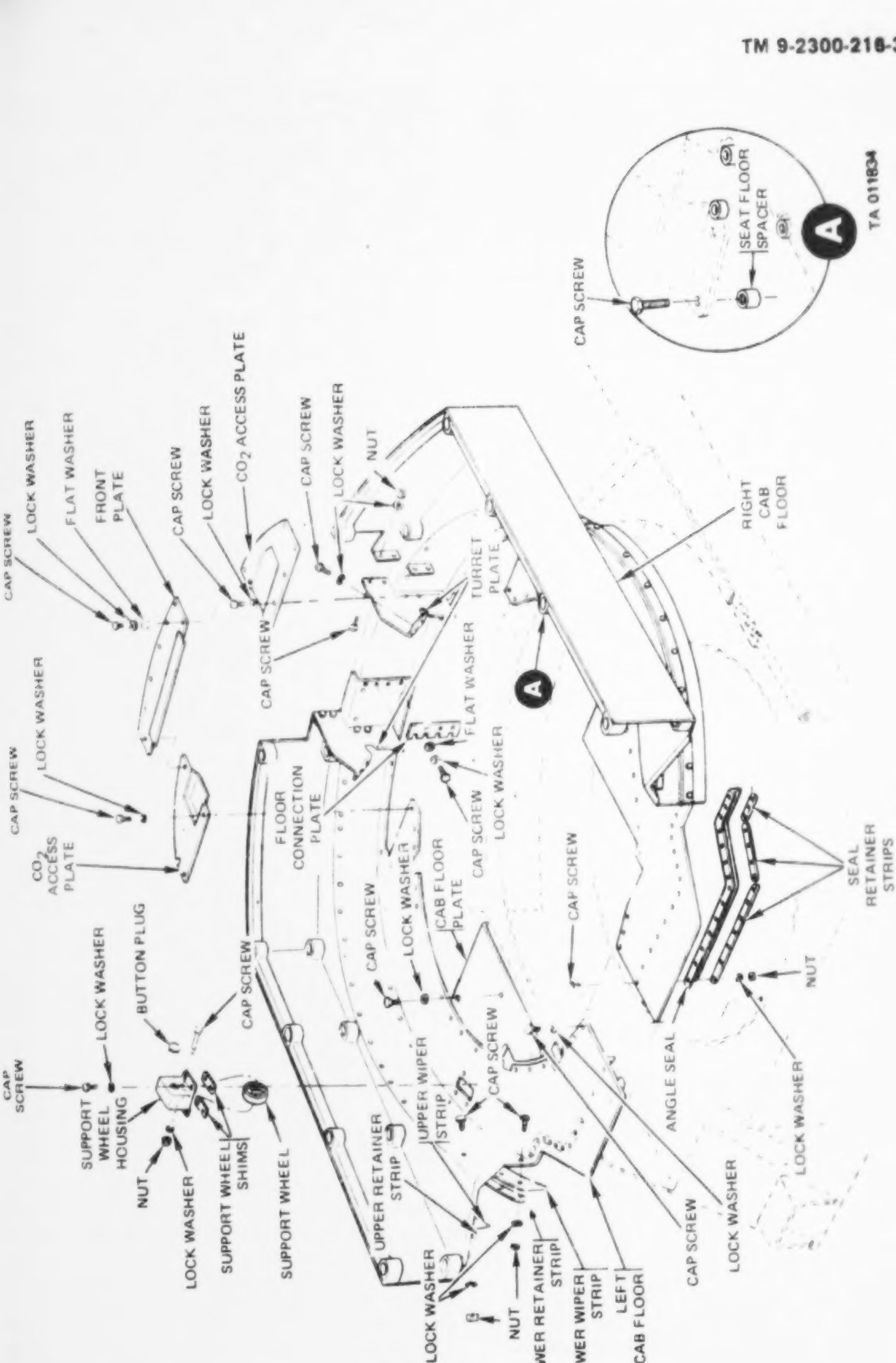

CAP SCREW
LOCK WASHER
FLAT WASHER
FRONT PLATE
CAP SCREW
LOCK WASHER
CO$_2$ ACCESS PLATE
CAP SCREW
LOCK WASHER
NUT
CAP SCREW
LOCK WASHER
CO$_2$ ACCESS PLATE
CAP SCREW
TURRET PLATE
FLOOR CONNECTION PLATE
FLAT WASHER
LOCK WASHER
CAP SCREW
A
RIGHT CAB FLOOR
CAP SCREW
SEAT FLOOR SPACER
A
TA 011834
CAP SCREW
SUPPORT WHEEL HOUSING
LOCK WASHER
BUTTON PLUG
CAP SCREW
NUT
LOCK WASHER
SUPPORT WHEEL SHIMS
SUPPORT WHEEL
UPPER RETAINER STRIP
UPPER WIPER STRIP
CAP SCREW
CAP SCREW
LOCK WASHER
CAB FLOOR PLATE
CAP SCREW
LOCK WASHER
CAP SCREW
SEAL RETAINER STRIPS
NUT
ANGLE SEAL
LOCK WASHER
LOCK WASHER
NUT
LOWER RETAINER STRIP
LOWER WIPER STRIP
LEFT CAB FLOOR
CAP SCREW
LOCK WASHER

Figure 23-7. Shelter kit cab floors and related parts installation.

(8) Secure left cab floor to turret with 18 cap screws (MS90726-65) and 18 lock washers (MS3533-42) threaded into existing turret seal tapped holes. Install all screws loosely to allow slight adjustment of floor. After all screws are installed, tighten securely.

(9) To install right cab floor, traverse cannon approximately 8 degrees to right and rotate loader and rammer to stow position.

(10) Using sling and hoist, position right cab floor on right side of turret. Carefully tilt and lower cab floor and work it around and under hydraulic tubes, wiring harnesses, hydraulic hand pump, elevating drive, and under rear edge of left cab floor.

(11) Lift floor slightly and install right top seal support flange (10946765) under upper wiper strip and onto previously installed center and right seal support flanges. Make sure that upper wiper strip is on top of seal support flange, and secure flange with nine cap screws (MS90726-5) and nine lock washers (MS35333-42) (fig. 23-7).

(12) Lower floor and position over turret seal tapped holes, making sure that rear support tabs are under left floor rear edge. Secure floor to turret with 18 cap screws (MS90726-65) and 18 lock washers (MS35333-42), threading screws into turret seal tapped holes. Install all screws loosely to allow slight adjustment of floor. After all screws are installed, tighten securely.

(13) Assemble two support wheels by installed support wheel (10956361) in housing (10946776) with lubrication fitting adjacent to button plug hole and secure with screw (MS51975-58), lock washer (MS35338-50) and nut (MS35691-49). Press button plug (142095) into housing.

(14) Install assembled support wheels on top side of cab floors with plug toward center of turret. Secure each wheel with shims (10956312) as required, four screws (MS90725-58) and four lock washers (MS35333-42).

NOTE

Use shims to adjust wheels to touch deck lightly.

(15) Install connection plate (10956313) on front riser of cab floors and secure with eight cap screws (MS90725-58), eight washers (MS27183-14) and eight lock washers (MS35333-42).

(16) Secure four pads (772590) to flanges on right and left front turret plates (10956604-1) with four cap screws (MS90726-57) and four lock washers (MS35333-42).

(17) Lift front of floors slightly to remove sag. Loosely install two turret plates (10956604-1 and 10956604-2) against drilled plates on front of right and left cab floors. Pads, installed in step (16) above, should rest evenly on front base of trunnions.

(18) Clamp both turret plates to respective floor plate and, using drilled floor plates as templates, mark and drill turret plates 0.406 + 0.030 inch diameter eight places.

(19) Install turret plates on floors and attach with eight cap screws (MS90726-58), eight lock washers (MS35333-42) and eight nuts (MS35691-21).

(20) Lift front of floors slightly to remove sag, and adjust turret plates so all pads rest evenly against trunnions. Tighten all screws and secure turret plates to floor.

CAUTION

Do not burn wiring harnesses while welding parts.

(21) Use turret plates and pads as templates to locate and weld pads to cannon trunnions.

(22) Adjust seal guides on vehicle side rails to guide the seal strips onto seal support flanges to avoid cutting seal strips when turret is traversed.

(23) Install right CO_2 access plate (10946783) on right front cab floor under elevating drive, and secure with four cap screws (MS90725-6) and four lock washers (MS35333-40).

(24) Install left CO_2 access plate (10946779) on left front cab floor and secure with four cap screws (MS90726-6) and four lock washers (MS35333-40).

(25) Install front floor plate assembly (10956307) and ends overlapping CO_2 access plates and secure with seven cap screws (MS90725-3), seven lock washers (MS35333-40) and seven flat washers (MS27183-11).

(26) Use floor plate (10946791) to locate, drill and tap two 0.375-24UNF-2B holes in left rear turret deck. Secure plate to deck with two cap screws (MS90725-65) and two lock washers (MS35333-42).

(27) Install harness guard (11642877) removed in paragraph 23-13*b* (14), on rear of right trunnion, and secure with three previously removed screws (MS90726-5) and three lock washers (MS35333-40).

(28) Install hydraulic elbow and two hydraulic tubes removed in paragraph 23-13*b* (13) in hydraulic hand pump. Bleed hydraulic tubes in accordance with TM 9-2300-216-20.

(29) Install right tube guard (11642979), removed in paragraph 23-13*b* (15), around hydraulic tubes at front base of right trunnion, and secure with four screws (MS90726-3) and five lock washers (MS35338-40).

(30) Install interphone control, removed in paragraph 23-13*b* (12), on right rear trunnion, and secure with four screws (MS35692-34) and four washers (MS45904-72).

(31) Rotate turret and floor, and check clearance of floor with forward deck. If interference occurs at rear air cleaner blower access cover screws, remove cover screws. Countersink cover rear screw holes. Install cover and secure with screws (MS35191-318).

(32) If water can bracket mounting pads are

welded on blower cover, grind off any interfering pad.

c. Shelter Kit Framework Installation (fig. 23-8).

(1) Install right cover bow (10946766-1) and left cover bow (10946766-2) in two front sockets on walls of cab floors with bow flanges against trunnions.

(2) Install bow support tube (10956365) over lugs on right and left cover bows and secure with two cap screws (MS90726-68) and two self-locking nuts (MS21044N6).

(3) Position end plates of left and right cover bows on center of trunnions, and use bow end plates as templates to locate, drill and tap eight 0.375-24UNF-2B holes in trunnions. Secure each bow end plate to trunnions with four cap screws (MS90726-60), four washers (MS27183-14) and four lock washers (MS35333-42). If necessary, grind trunnion at bow upper end plate location, so bow end plates fit flat on trunnion.

(4) Install right front cover support (10946795-1), right second cover support (10946793-1) and right third and fourth supports (10946793-2) in sockets on wall of right cab floor.

(5) Install left front cover support (10946795-2) and second, third and fourth left cover supports (10946793-2) in sockets on wall of left cab floor.

(6) Install front cover support beam (10956364) on left and right cover front bows, and secure with two strips (11643343), four washers (MS27183-10), four lock washers (MS35333-40) and four cap screws (MS90726-6) threaded into beam.

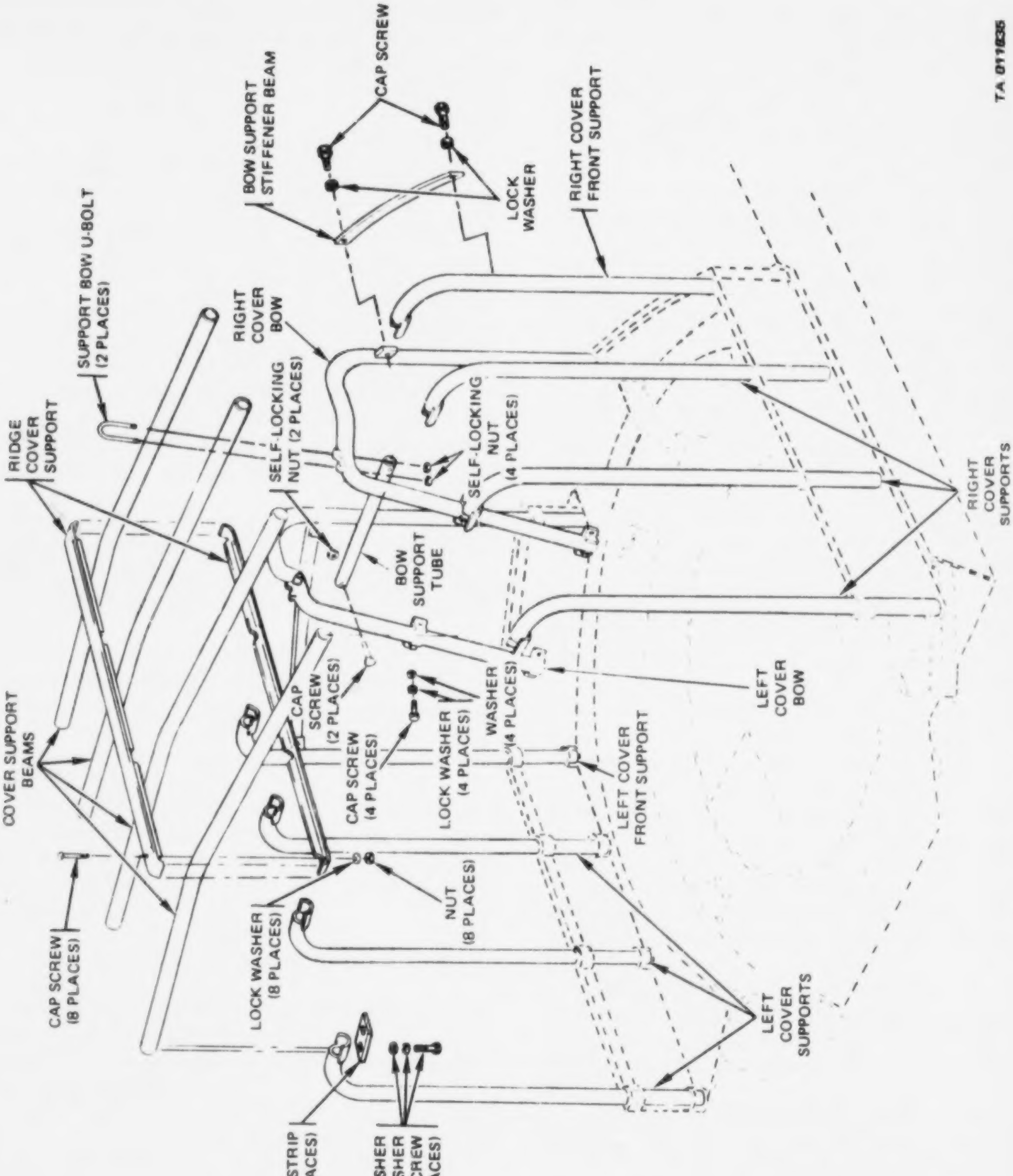
(7) Install second cover support beam (10956310) between left and right second cover supports, and secure with two strips (11643343), four lock washers (MS35333-40), four washers (MS27183-10) and four cap screws (MS90726-6) threaded into beam.

(8) Install third and fourth cover support beams (10956364) on left and right third and fourth cover supports, and secure each beam with two strips (11643343), four lock washers (MS35333-40), four washers (MS27183-10) and four cap screws (MS90726-6) threaded into beam.

(9) Secure front cover support beam to top of left and right cover bows with two support U-bolts (10956359) and four self-locking nuts (MS21044N6).

(10) Install two cover support ridges (10946775-1 and 10946775) over and below peaks of cover support beams and secure with eight screws (MS35207-318), eight lock washers (MS35333-42) and eight nuts (MS51968-8).

(11) Secure two bow support stiffener beams (10956315) to brackets on front supports and brackets on cover bows, and secure with four cap screws (MS90725-64) and four lock washers (MS35333-42).


CAP SCREW
BOW SUPPORT STIFFENER BEAM
LOCK WASHER
RIGHT COVER FRONT SUPPORT
SUPPORT BOW U-BOLT (2 PLACES)
RIGHT COVER BOW
SELF-LOCKING NUT (2 PLACES)
SELF-LOCKING NUT (4 PLACES)
RIGHT COVER SUPPORTS
RIDGE COVER SUPPORT
BOW SUPPORT TUBE
LEFT COVER BOW
COVER SUPPORT BEAMS
CAP SCREW (2 PLACES)
CAP SCREW (4 PLACES)
LOCK WASHER (4 PLACES)
WASHER (4 PLACES)
LEFT COVER FRONT SUPPORT
CAP SCREW (8 PLACES)
LOCK WASHER (8 PLACES)
NUT (8 PLACES)
LEFT COVER SUPPORTS
STRIP (8 PLACES)
WASHER
LOCK WASHER
CAP SCREW (16 PLACES)

TA 011835

Figure 23-8. Shelter kit shroud supports, beams and related parts installation.

d. Dome Lights and Wiring Harness Installation (fig. 23-9).

NOTE

Dome lights are positioned so as not to interfere with shroud securing straps.

(1) Position one dome light bracket (10946799) on underside of front cover support, so inside edge is 12.75 inches to right of right cover front support centerline, and secure with bracket clamp (10956314), two cap screws (MS90726-55), two lock washers (MS35333-42) and two nuts (MS35691-21).

(2) Position one dome light bracket (10946799) on underside of second cover support, so inside edge is 27.0 inches to left of cover support ridge left edge, and secure with bracket clamp (10956314), two cap screws (MS90726-55), two lock washers (MS35333-42) and two nuts (MS35691-21).

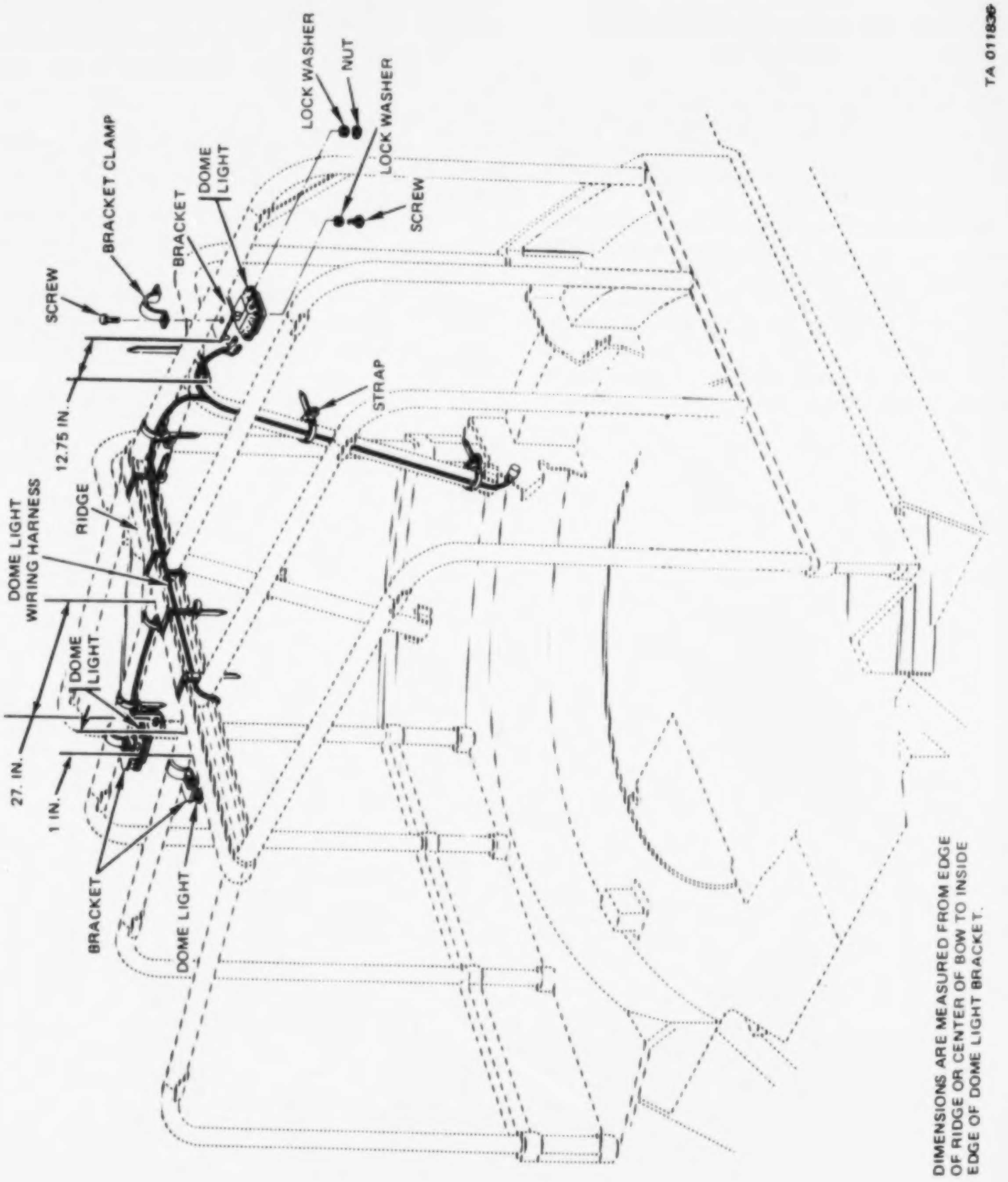
(3) Position one dome light bracket (10946799) on underside of third cover support with inside edge of bracket 1 inch to left of cover support ridge left edge, and secure with bracket clamp (10956314), two cap screws (MS90726-55), two lock washers (MS35333-42) and two nuts (MS35691-21).

(4) Assemble three dome lights (MS51073-1) on light brackets (10946799), and secure each light with four cap screws (MS90725-6) and four lock washers (MS35333-40).

(5) Connect wiring harness (10934558) to each dome light and attach ground wires to dome light mounting screws.

(6) Place wiring harness in position along beams and ridge, and secure with wiring harness straps (10921769).

(7) Route end of harness down right cover bow to trunnion, and connect to utility outlet at right side of trunnion. Secure harness with additional straps as required.


LOCK WASHER
NUT
LOCK WASHER
SCREW
DOME LIGHT
BRACKET
BRACKET CLAMP
SCREW
12.75 IN.
STRAP
RIDGE
DOME LIGHT WIRING HARNESS
DOME LIGHT
27. IN.
1 IN.
BRACKET
DOME LIGHT
TA 011836

NOTE: DIMENSIONS ARE MEASURED FROM EDGE OF RIDGE OR CENTER OF BOW TO INSIDE EDGE OF DOME LIGHT BRACKET.

Figure 23-9. Shelter kit dome lights and wiring harness installation.

e. Brackets, Boxes, Clips and Straps Installation. Brackets, boxes, clips and straps are installed on the cab floors to stow the basic issue items removed in paragraph 23-13. The items to be installed are listed in table 23-2. Location of the brackets, boxes, clips, and straps are shown in figure 23-10. Mounting provisions are provided on the floor assemblies.

Table 23-2. New Items for Basic Issue Items Stowage Provisions

Part number	Description	Qty.	Use
5266186	Clip, rifle muzzle	4	Rifle stowage
MS35207-279	Screw, rifle clip	4	Rifle stowage
MS35338-44	Washer, rifle clip	12	Rifle stowage
8763447	Clip, rifle stock	4	Rifle stowage
MS90726-5	Screw, rifle clip	8	Rifle stowage
MS51968-2	Nut, rifle clip	8	Rifle stowage
MS51968-8	Nut, water can bracket	8	Water can stowage
MS90726-58	Screw, water can bracket	8	Water can stowage
MS27183-14	Washer, water can bracket	8	Water can stowage
MS51986-2	Nut, hand-grenade box	8	Hand-grenade box stowage
MS90726-6	Screw, hand-grenade box	8	Hand-grenade box stowage
MS90725-60	Screw, fire-extinguisher bracket	4	Portable fire extinguisher stowage
MS90726-113	Screw, assistant gunner's seat bracket	4	Mounting assistant gunner's seat
10946762	Spacer, assistant gunner's seat bracket	4	Mounting assistant gunner's seat
10946771	Back, personnel seat	1	Personnel seat
7066967	Rack, water canteen	2	Water canteens stowage
MS51968-2	Nut	4	Canteen rack fastener
MS90726-8	Screw	4	Canteen rack fastener
MS27183-10	Washer	4	Canteen rack fastener
MS35338-44	Lock washer	4	Canteen rack fastener
8690471	Strap, assembly	2	Tool bag fastener
8690466	Strap, assembly	4	Track connecting fixture
8690463	Strap, assembly	1	Lever bar fastener
10956410	Basket, tarp	1	Canvas paulin stowage

(1) *Rifle clips installation.* Install two rifle muzzle clips (5266186) on right forward wall of right floor and secure with two screws (MS35206-279) and two lock washers (MS35338-44). Install two rifle muzzle clips (5266186) on forward wall of left floor and secure with two screws (MS35206-279) and two lock washers (MS35338-44). Install two rifle stock clips (8763447) on forward wall of right floor and secure with four cap screws (MS90726-5), four lock washers (MS35338-44) and four nuts (MS51968-2). Install two rifle stock clips (8763447) on forward wall of left floor and secure with four cap screws (MS90726-5), four lock washers (MS35338-44) and four nuts (MS51968-2).

(2) *Water can brackets installation.* Install water can bracket (10904052) on forward side wall of right floor and secure with four cap screws (MS27183-14), four lock washers (MS35338-46) and four nuts (MS51968-8). Install water can bracket (10904052) on forward side wall on left floor and secure with four cap screws (MS27183-14), four lock washers (MS35338-45) and four nuts (MS51968-8).

(3) *Grenade boxes installation.* Install grenade box (8700274) on rear side wall of right floor and secure with four cap screws (MS90726-6), four lock washers (MS35338-44) and four nuts (MS51968-2). Install grenade box (8700274) on center of lower riser on left floor and secure with four cap screws (MS90726-6), four lock washers (MS35338-44) and four nuts (MS51968-2).

(4) *Fire extinguisher bracket installation.* Install fire extinguisher bracket on upper side wall of left floor and secure with four cap screws (MS90725-60) and four lock washers (MS35338-46).

(5) *Interphone reel bracket installation.* Install interphone reel bracket on right rear corner of hull (fig. 23-3) and secure with four screws and washers removed with bracket.

(6) *Gunner's seat installation.* Install gunner's seat and seat support assembly on four boss mountings on left turret deck (fig. 23-3) and secure with four screws and washers removed with the seat and support.

(7) *Assistant gunner's seat installation.* Install four seat floor spacers (10946762) (fig. 23-7) on four boss mountings on right turret deck. Install assistant gunner's seat and bracket on spacers and secure with four cap screws (MS90726-113) and four washers removed with the seat.

(8) *Amplifier mount bracket installation.* Lift amplifier mount bracket from turret trunnion. Install amplifier mount bracket on assistant gunner's seat bracket (fig. 23-3) and secure with four cap screws, four lock washers and four nuts removed with seat bracket. Make sure that harness connections to amplifier are tight and secure.

(9) *Interphone control installation.* Lift interphone control from trunnion and install on right trunnion (fig. 23-3) and secure with four screws and four lock washers removed with control.

(10) *Personnel seat installation.* Install seat back

(10946771) on rear of right cab floor and position legs over rods on cab floor. Attach seat back to top of cab floor with two quick-release pins attached to seat back. Position seat (10902155), removed in paragraph 23-13*b*(10), on seat back legs and secure with two cap screws (MS90726-69) and two self-locking nuts (MS21044N6). Hook seat chains through retainers on seat back and secure with two cap screws (MS90726-60) and two self-locking nuts (MS21044N6). Install two seat cushions (10902156) and two safety belts (8740941).

(11) *Water canteen rack installation.* Position a water canteen rack (5266186) on outboard side of both turret plates. Secure each rack with two cap screws (MS90726-8), two flat washers (MS27183-10), two lock washers (MS35338-44) and two nuts (MS51968-2).

(12) *Straps installation.* Attach two tool bag straps (8690471) to two footman loops on front of left cab floor. Attach a lever bar strap (8690463) to footman loop on side of left cab floor. Attach four track connecting fixture straps (8690466) to eight footman loops on side of left cab floor.

(13) *Tarp basket installation.* Install tarp basket (10956410) on clips located at front of right cab floor. Install strap (8690482) in two footman loops, through back of basket and tighten to secure basket.

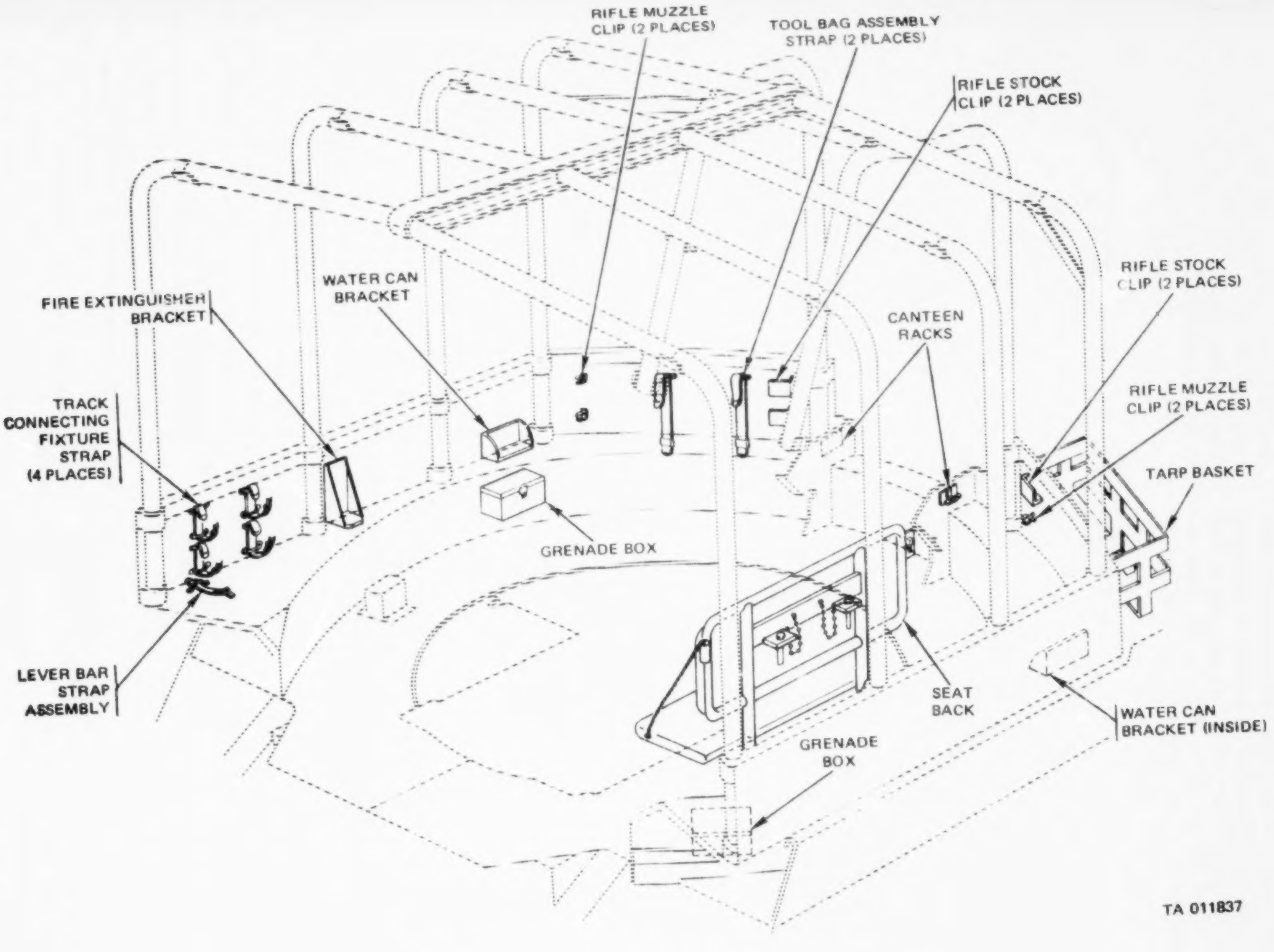

RIFLE MUZZLE CLIP (2 PLACES)
TOOL BAG ASSEMBLY STRAP (2 PLACES)
RIFLE STOCK CLIP (2 PLACES)
WATER CAN BRACKET
FIRE EXTINGUISHER BRACKET
RIFLE STOCK CLIP (2 PLACES)
CANTEEN RACKS
TRACK CONNECTING FIXTURE STRAP (4 PLACES)
RIFLE MUZZLE CLIP (2 PLACES)
TARP BASKET
GRENADE BOX
LEVER BAR STRAP ASSEMBLY
SEAT BACK
WATER CAN BRACKET (INSIDE)
GRENADE BOX
TA 011837

Figure 23-10. Basic issue items brackets, boxes, clips and straps installation.

(14) *Signs installation* (fig. 23-11). Make and apply stencil signs to floor to identify location of basic issue items. Stencil markings are ½ inch high with ⅛-inch legs. Apply stencil signs with enamel, Class A, specification TT-E-489, using white enamel on OD surfaces. When possible, position stencil so that it is covered by the item named when the item is stowed. Repair any signs that may be damaged during shelter kit cover installation.

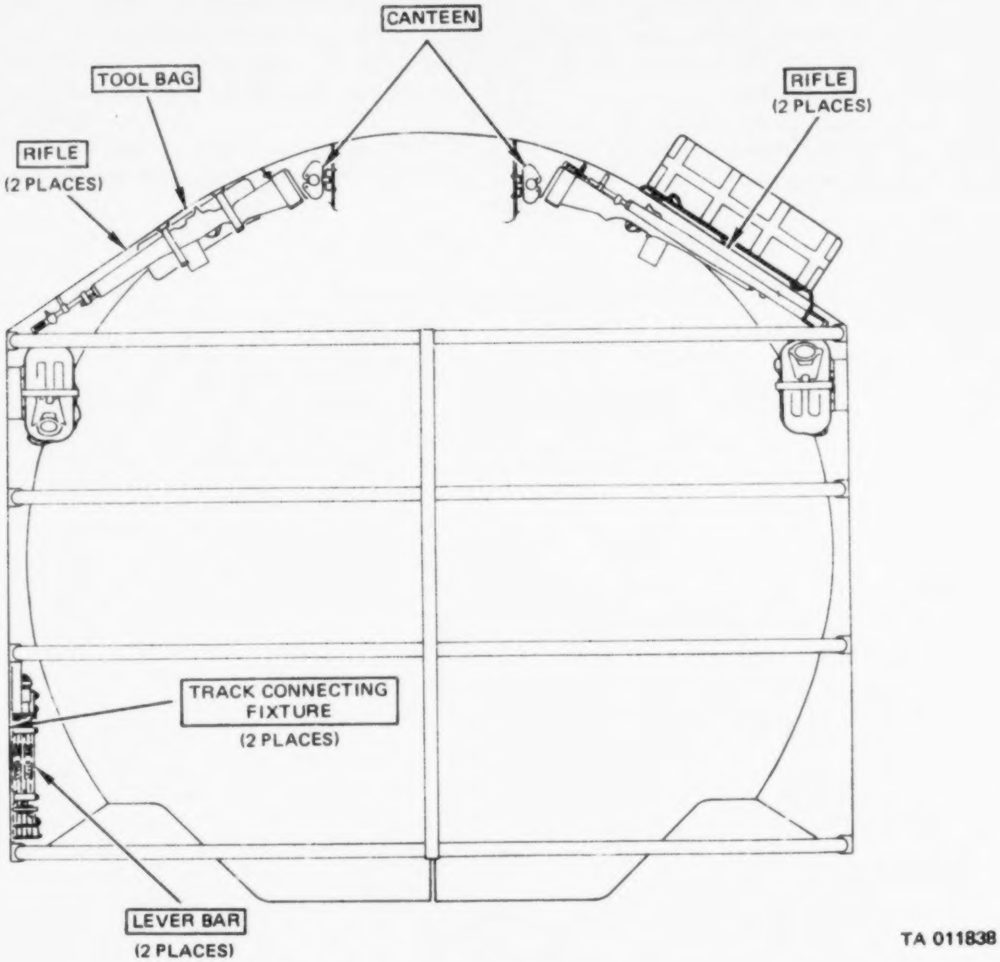


Figure 23-11. Shelter kit stencil sign locations.

f. Cover Installation (fig. 23-12).

(1) Position cover on cab framework and secure to framework with straps sewn to inside of cover.

(2) Attach lower edges of cover sides by lacing cords under hooks on front and both side walls of cab floor. Secure rear corners of cover sides with straps to footman loops.

(3) Attach lower edge of rear panel to cab floor by fastening straps to footman loops with ten rear cover hooks along rear edge of floor.

(4) Secure right and left side panel flaps by inserting grommet staples on one flap through grommets on other flap and then lacing four ropes through grommet staples.

(5) Secure rear right corner of rear panel by lacing rope around hooks attached to side and rear panels.

(6) Secure rear left corner of rear panel by lacing rope through grommet staples as in step (4) above.

(7) Secure outside corners of front panels to side panels by lacing two ropes around hooks as in step (5) above.

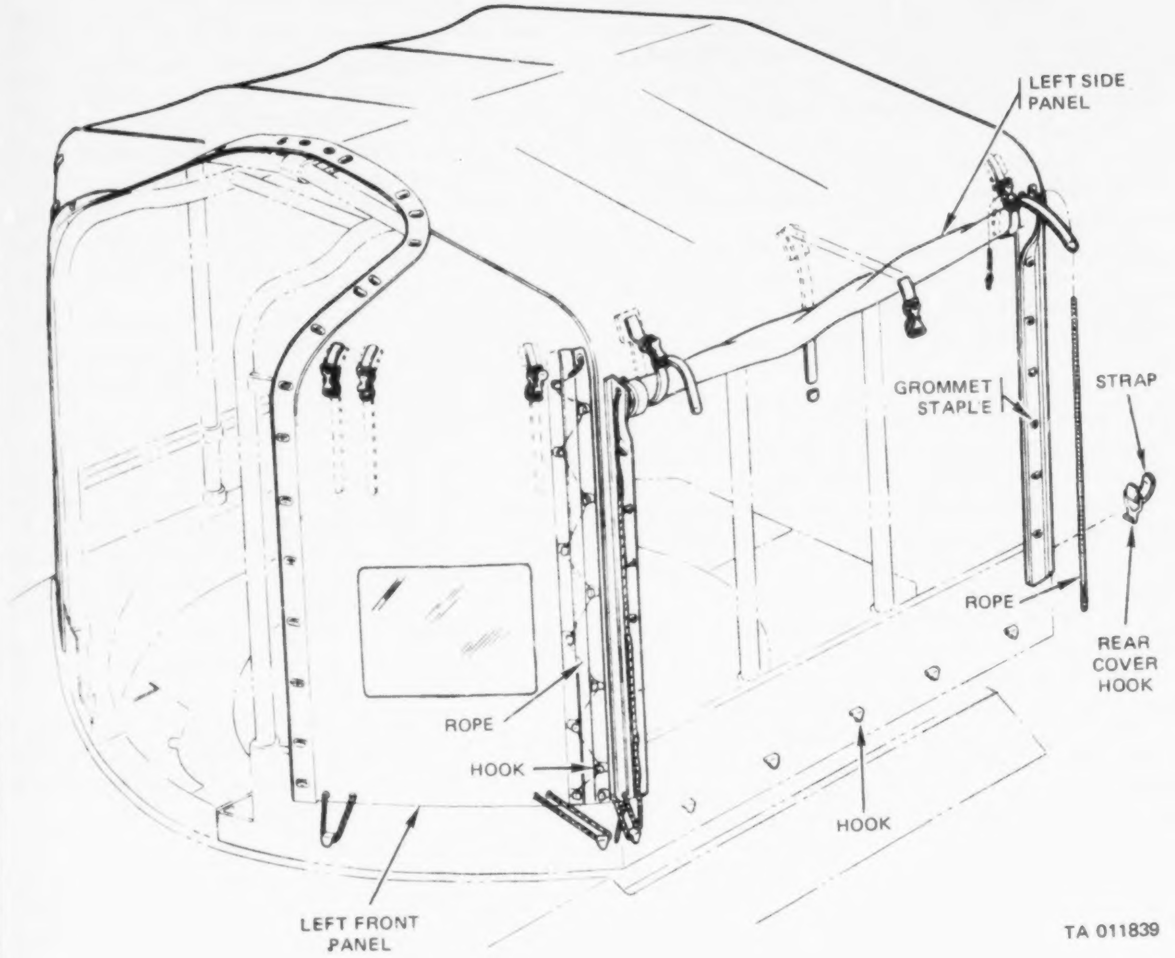


Figure 23-12. Shelter kit cover assembly installation.

g. *Shroud Installation* (figs. 23-13 and 23-14).

(1) Remove seven cap screws and lock washers from right side and bottom of front end of gun or howitzer mount assembly M158.

(2) Temporarily install front shroud bottom strap (10956390) with a 1/16 shim and secure with cap screws and lock washers removed in (1) above. Use strap as a template and drill and tap one hole 0.500-13UNC-2B, 0.62-inch deep, on left side of mount assembly (A, fig. 23-14). Remove screws, lock washers and strap. Dispose of screws and retain lock washers for use in steps (7) and (8).

NOTE

If required, strap holes may be drilled 0.594 inch to match holes in bottom of mount assembly.

(3) Position bottom shroud support strip (10956384) (A, fig. 23-14) on underside of mount assembly. Use strip as a template, and drill and tap four 0.375-16UNC-2B holes in mount.

(4) Position two left side shroud support strips (10956374) flush with the bottom of the mount. Use strip as a template and drill and tap two 0.375-16UNC-2B holes into mount for each strip.

(5) Position right side support strip (10956384) flush with the bottom of the mount. Use strip as a template and drill and tap four 0.375-16UNC-2B holes in mount.

(6) Position shroud over cannon muzzle and down over front of mount assembly.

(7) Position gun seal on cannon at front of mount assembly.

(8) Remove two screws securing variable recoil cylinder on left front upper edge of mount assembly. Position gun seal flange over gun seal and secure flange and variable recoil cylinder to mount with two

screws (MS90725-110 and MS90725-113).

(9) Pull forward edge of shroud over gun seal, under seal flange, around forward upper and around lower edge of mount assembly. Secure with shroud bottom strap (10956390), a ¾-inch cap screw (MS90725-107) and lock washer (MS35338-48) on the left side, and five 1-⅛-inch cap screws (MS90725-110) and five lock washers (removed in step (2)) across the bottom. Make holes in shroud assembly as required to accept screws.

(10) Aline the two screw holes on the right side of the gun seal with the top two screw holes on the shroud bottom strap and secure with two 1-⅜-inch cap screws (MS90725-112) and two lock washers removed in step (2).

(11) Secure three shroud support cords (11642632) to the top of the rear flange of the gun seal with three 1-inch cap screws (MS90726-60), three lock washers (MS35338-46) and three nuts (MS35691-21). Pull the three elastic cords under and through shroud and secure ends of cord assemblies to forward end of U-bolts securing bows to beam and one screw securing ridges, using existing nuts.

(12) Position leading edge of shroud over gun seal, making certain shroud is evenly draped on both sides. Position seal strip (11643164) over edge of shroud and gun seal; press strip and shroud into gun seal.

(13) Install shroud trunnion assembly and shroud coupler assembly on gun seal. Secure trunnion and coupler assemblies with two cap screws (MS90728-68), two lock washers (MS35338-46) and two nuts (MS51967-8), making slits in shroud for screws as required. Wrap trunnion and coupler assemblies around seal and shroud and secure with T-bolt. Pull lower edges of shroud down along both sides of mount assembly and secure to sides and underside of mount assembly with two left side shroud support strips (10956374), one bottom shroud support strip (10956384) and one right side shroud support strip (10956384), and secure strips with cap screws (MS90725-57) and lock washers (MS35333-42). Make certain rounded edges of strips are against shroud. Make holes in shroud assembly, as required, to accept screws.

(14) Insert grommet staples along edge of right and left front cover, through grommets on rear of shroud. String two 104-inch ropes, one each side, down through grommet staples.

(15) Pull lower edges of shroud down against front edge of left floor and right floor; install shroud bottom skirt. Secure shroud and skirt to front of cab floors with two rear shroud support strips (10956384). Make certain that rounded edges of strips are against skirt, and attach each strip with four cap screws (MS90725-58) and four washers (MS35333-42). Secure skirt to front underside of cab floors with six cap screws (MS90725-55), six lock washers (MS35338-46) and six washers (MS27183-14).

(16) Elevate cannon and check operation of shroud, for binding and stretching (fig. 23-15). Note clearance of replenisher plug and bow. Disconnect or move cover strap if required.

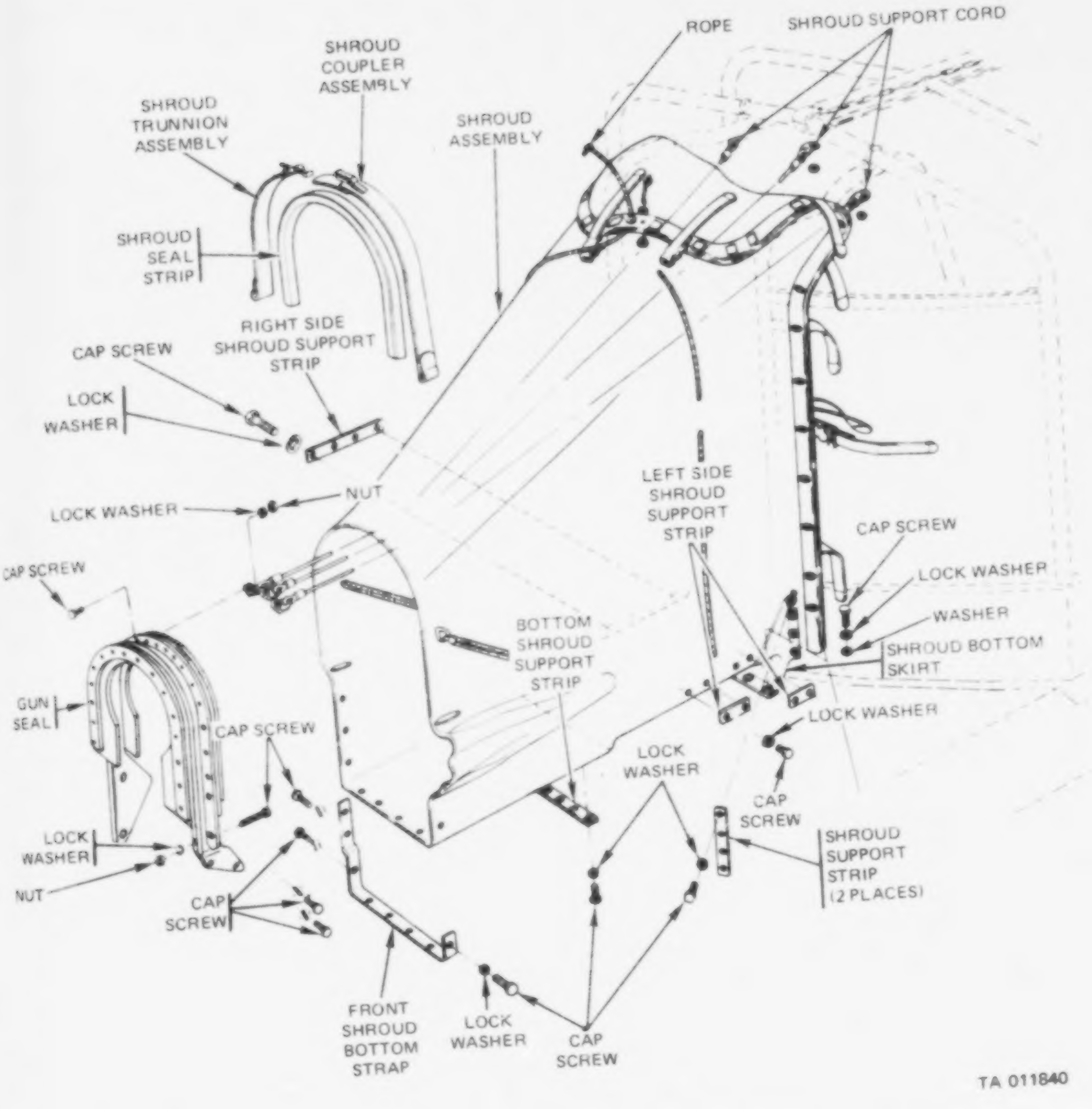
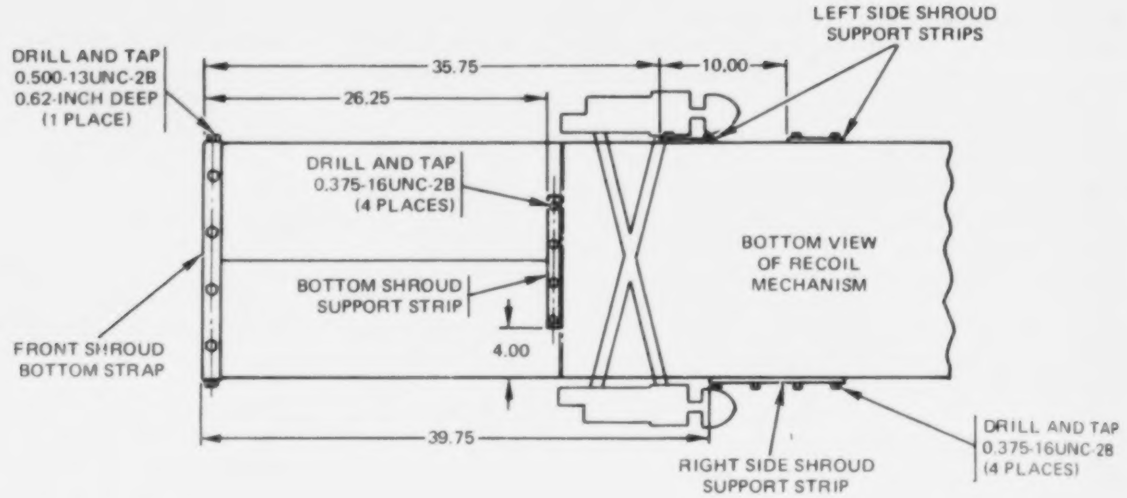
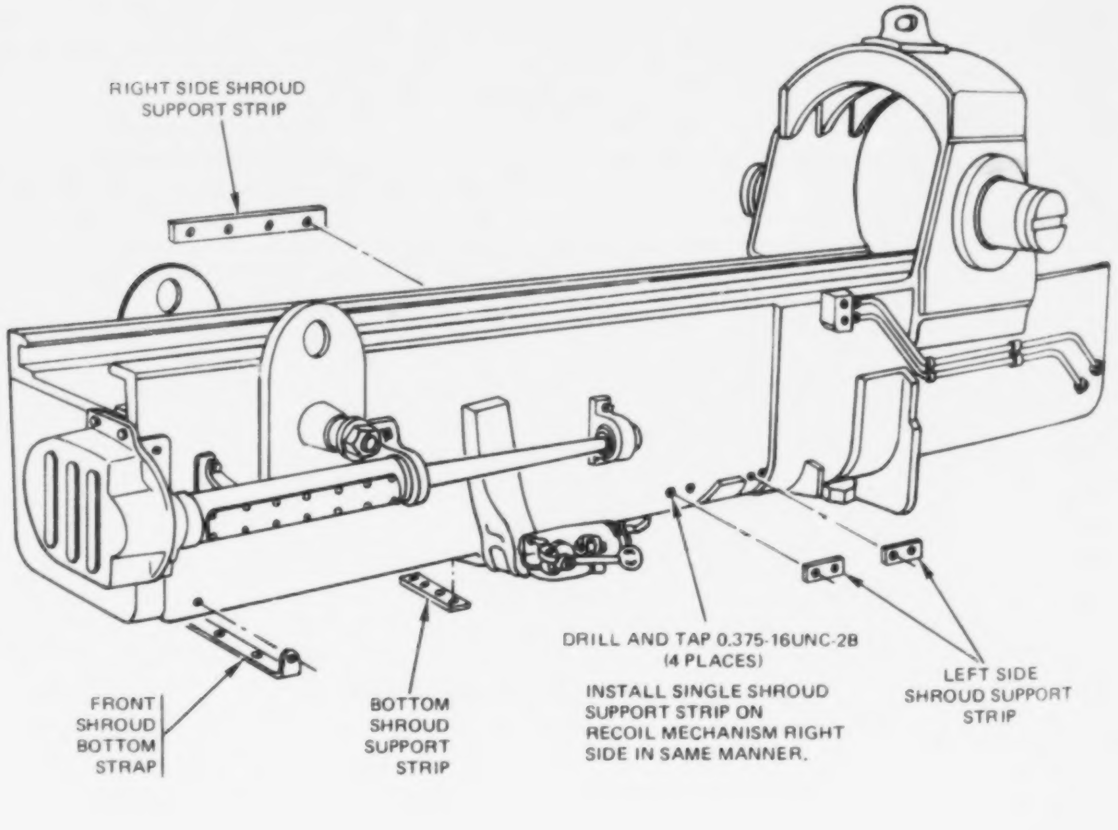

ROPE
SHROUD SUPPORT CORD
SHROUD COUPLER ASSEMBLY
SHROUD TRUNNION ASSEMBLY
SHROUD ASSEMBLY
SHROUD SEAL STRIP
RIGHT SIDE SHROUD SUPPORT STRIP
CAP SCREW
LOCK WASHER
NUT
LOCK WASHER
CAP SCREW
LEFT SIDE SHROUD SUPPORT STRIP
CAP SCREW
LOCK WASHER
WASHER
SHROUD BOTTOM SKIRT
BOTTOM SHROUD SUPPORT STRIP
GUN SEAL
CAP SCREW
LOCK WASHER
LOCK WASHER
NUT
CAP SCREW
CAP SCREW
SHROUD SUPPORT STRIP (2 PLACES)
FRONT SHROUD BOTTOM STRAP
LOCK WASHER
CAP SCREW
TA 011840

Figure 23-13. Shelter kit shroud assembly installation.


DRILL AND TAP
0.500-13UNC-2B
0.62-INCH DEEP
(1 PLACE)
35.75
10.00
26.25
LEFT SIDE SHROUD
SUPPORT STRIPS
DRILL AND TAP
0.375-16UNC-2B
(4 PLACES)
BOTTOM VIEW
OF RECOIL
MECHANISM
BOTTOM SHROUD
SUPPORT STRIP
FRONT SHROUD
BOTTOM STRAP
4.00
39.75
RIGHT SIDE SHROUD
SUPPORT STRIP
DRILL AND TAP
0.375-16UNC-2B
(4 PLACES)

A. SHROUD STRAP AND SUPPORT STRIPS INSTALLATION DIMENSIONS.


RIGHT SIDE SHROUD
SUPPORT STRIP
FRONT
SHROUD
BOTTOM
STRAP
BOTTOM
SHROUD
SUPPORT
STRIP
DRILL AND TAP 0.375-16UNC-2B
(4 PLACES)
LEFT SIDE
SHROUD SUPPORT
STRIP

INSTALL SINGLE SHROUD SUPPORT STRIP ON RECOIL MECHANISM RIGHT SIDE IN SAME MANNER.

B. SHROUD STRAP AND SUPPORT STRIPS GENERAL LOCATION.

TA 011841

Figure 23-14. Shelter kit shroud strap and support strips installation.

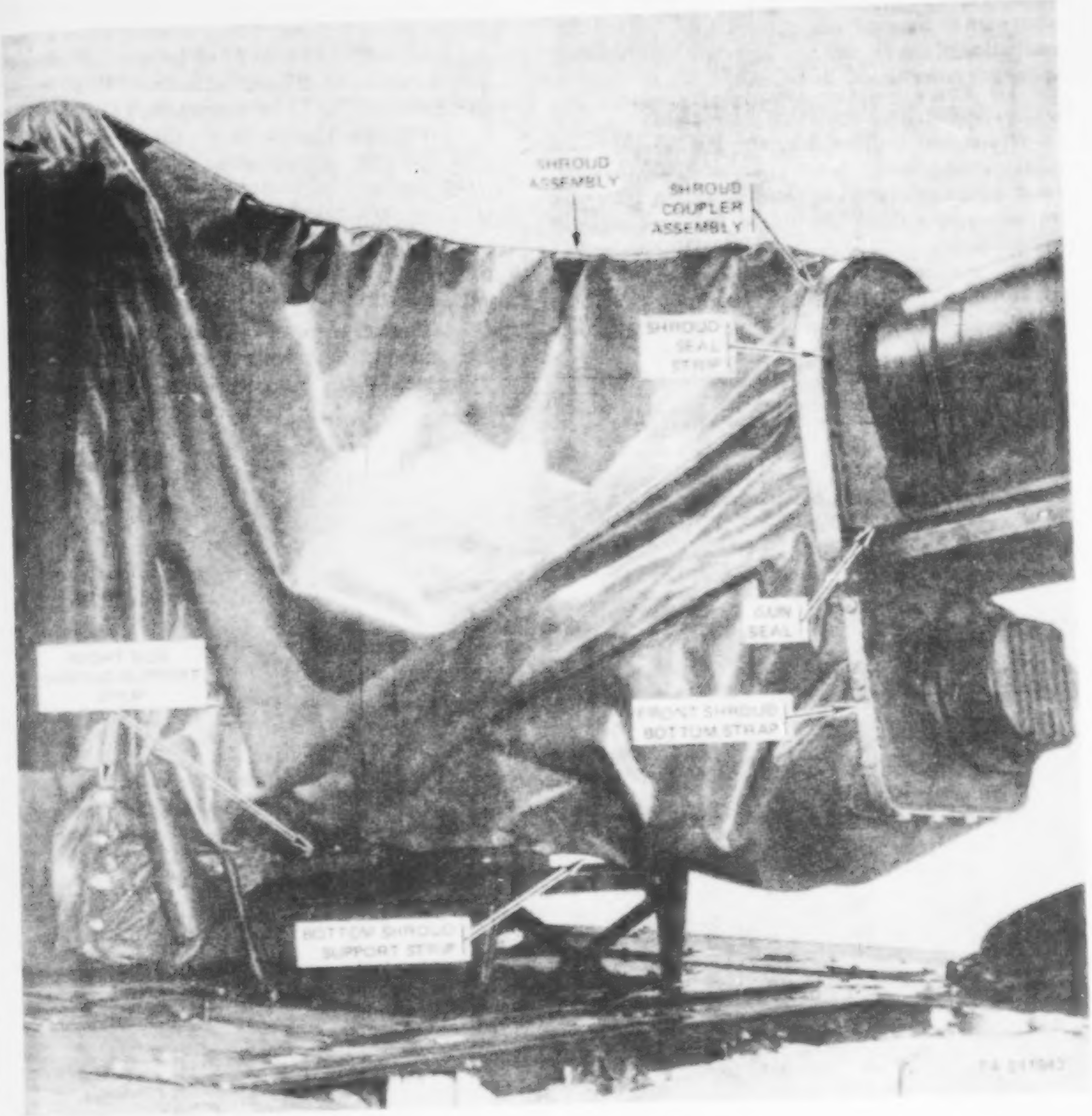

SHROUD ASSEMBLY
SHROUD COUPLER ASSEMBLY
SHROUD SEAL STRAP
GUN SEAL
RIGHT SIDE SHROUD SUPPORT STRAP
FRONT SHROUD BOTTOM STRAP
BOTTOM SHROUD SUPPORT STRAP

Figure 23-15. Shroud installed — right side view.

23-15. Crew Shelter Kit Removal

The crew shelter kit is removed in reverse order of installation, except refer to TM 9-2300-216-20 for removal procedures.

23-16. Crew Shelter Kit Repair

Repair crew shelter kit. For repair procedures refer to paragraph 23-31*e*.

Section VI. CREW HEATER KIT

23-17. General

The crew personnel heater kit is installed on the right side of the crew personnel shelter to provide heated air to the crew and armament during cold weather. The heater kit consists of a diffuser to control the flow of heated air, a duct to direct heated air to the left side of the compartment, electrical leads to connect the heater to the vehicle power, a heater assembly, and connectors and mounting hardware. The heater is a 60,000 BTU/hr, multifuel, combustion type, and operates on any motor fuel. It is a self-contained unit with an attached fuel tank. Before installing this kit, the crew shelter should be cleaned thoroughly, especially the adjacent area on the right side of the shelter. To facilitate installation of the kit, the rear and right side panels of the shelter cover should be rolled up.

23-18. Crew Heater Kit Installation

a. Heater and Diffuser Assembly (fig. 23-16).

(1) Install lower heater bracket (10934563) on heater assembly mount (10946350) and secure with two cap screws (MS90726-3) and two lock washers (MS35333-40).

(2) Install upper bracket (10934562) on heater assembly mounting bracket, and secure with two cap screws (MS90726-3) and two lock washers (MS35333-40).

(3) Install hot air diffuser (10956420) on heater assembly (11643111), and temporarily mount them on right wall of cab floor, adjusting heater and diffuser connection as required. Using existing holes in heater as guides, mark location of four holes in diffuser collar. Secure heater to diffuser with four machine screws (MS35207-263) and four lock washers (MS35333-39).

(4) Install hot air duct adapter (10956417) on diffuser and secure with four machine screws (MS35207-263), four lock washers (MS35333-39), and four nuts (MS35650-302).

(5) Install exhaust tube (10956422) on exhaust port outlet of heater and secure with hose clamp (MS35842-13). Torque clamp screw to 80-100 lb in.

(6) Install air duct bracket (10956618) on heater fuel tank and secure with screw (MS90726-7) and existing washer and nut, securing electrical lead to fuel tank.

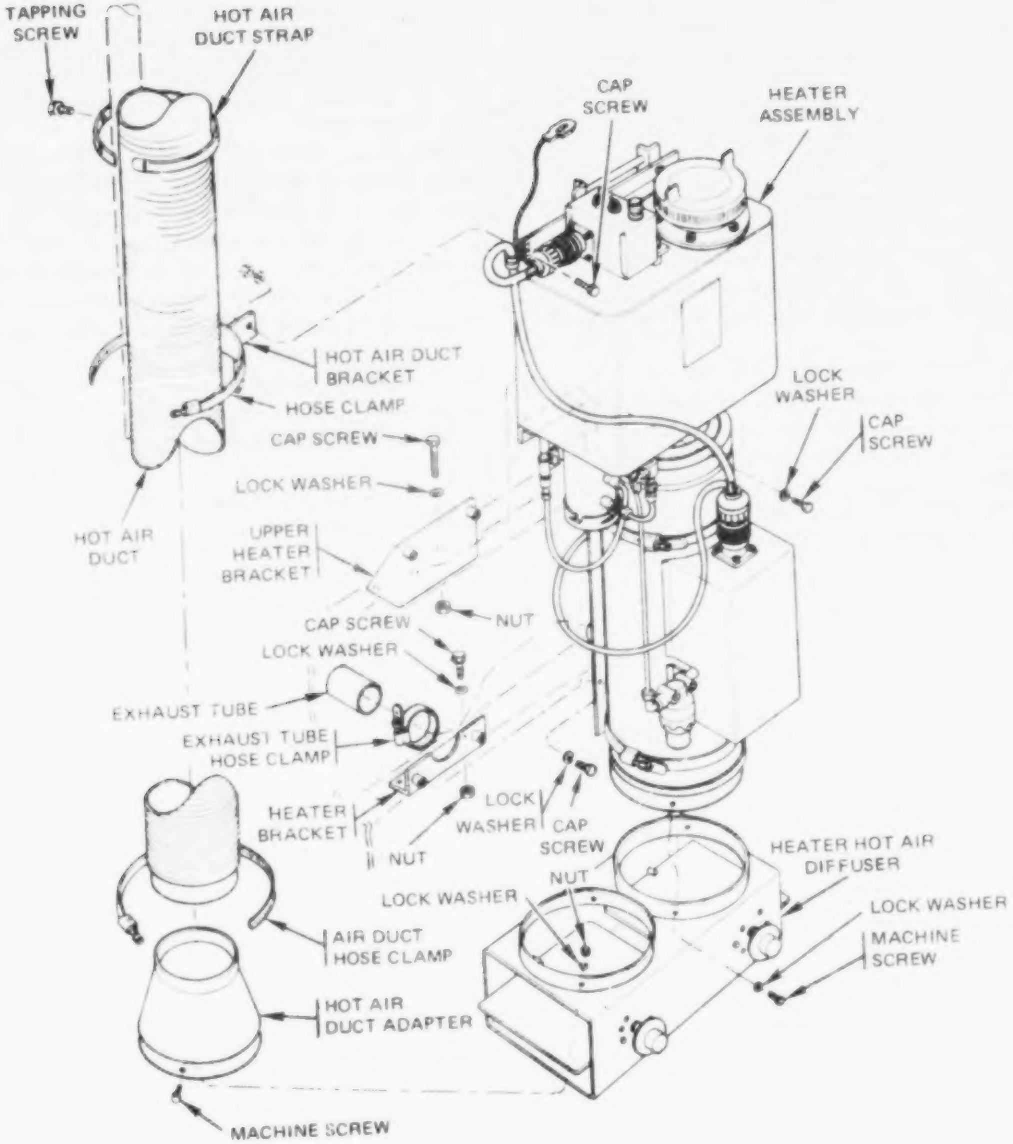

TAPPING SCREW
HOT AIR DUCT STRAP
CAP SCREW
HEATER ASSEMBLY
HOT AIR DUCT BRACKET
HOSE CLAMP
CAP SCREW
LOCK WASHER
LOCK WASHER
CAP SCREW
HOT AIR DUCT
UPPER HEATER BRACKET
CAP SCREW
NUT
LOCK WASHER
EXHAUST TUBE
EXHAUST TUBE HOSE CLAMP
HEATER BRACKET
LOCK WASHER
CAP SCREW
NUT
NUT
HEATER HOT AIR DIFFUSER
LOCK WASHER
LOCK WASHER
MACHINE SCREW
AIR DUCT HOSE CLAMP
HOT AIR DUCT ADAPTER
MACHINE SCREW
TA 011843

Figure 23-16. Crew heater assembly and installation.

b. Heater and Diffuser Installation (fig. 23-16).

(1) Mount assembled heater and diffuser on right wall of shelter cab floor just rear of second beam support.

(2) Secure heater to floor wall with two cap screws (MS90726-6), three cap screws (MS90726-18), five lock washers (MS35333-40) and five nuts (MS51968-2) through upper and lower heater brackets.

c. Heater Duct Installation (figs. 23-16 and 23-17).

(1) Install hot air duct (10956434) on hot air duct adapter and secure with clamp (MS35842-16).

(2) Secure duct to top of heater with clamp (MS35842-16).

(3) Route duct along side beam support and beam, past center of crew compartment. Secure duct to beam support and beam with four straps (10956416) spaced to match tapped holes in support and beam. Secure straps to support and beam with four tapping screws (MS24629-58).

d. Electrical Lead Installation (fig. 23-17).

(1) Connect crew heater lead (10882043) to heater control-box connector. Route lead along cab floor wall, forward cover support, support beam, right cover bow, and right trunnion to turret well, and install lead connector in bracket at left side of hull bottom. Secure lead with straps (10934558) as required.

(2) Install circuit breaker to line disconnect bracket lead (10882042) in bracket at left side of hull bottom in turret well and connect one of two branch leads to heater electrical lead (10882043). Cap other branch lead with shell (8338572) and plug (7982907).

(3) Remove CO_2 access cover on left side of vehicle. If rheostat assembly is mounted on underside of electrical accessories panel, remove and install on top side of panel. If panel assembly is mounted with flange adjacent to underside of deck, remove panel and reinstall with flange down.

(4) Using circuit breaker (M13516/1-4) as a template, drill and tap two holes 8-36NF-2B in rear outside edge of electrical accessories panel (fig. 23-18). Secure circuit breaker to underside of panel with two screws (MS35266-47) and two washers (MS35333-38).

(5) Attach circuit breaker-to-line-disconnect bracket lead (10882042) to circuit breaker (fig. 23-17). Connect battery positive terminal to circuit breaker lead (10934557) to circuit breaker. Open battery compartment door and connect this lead to positive terminal of battery, using existing screw and nut on terminal.

(6) Close and secure battery compartment door. Install CO_2 access cover.

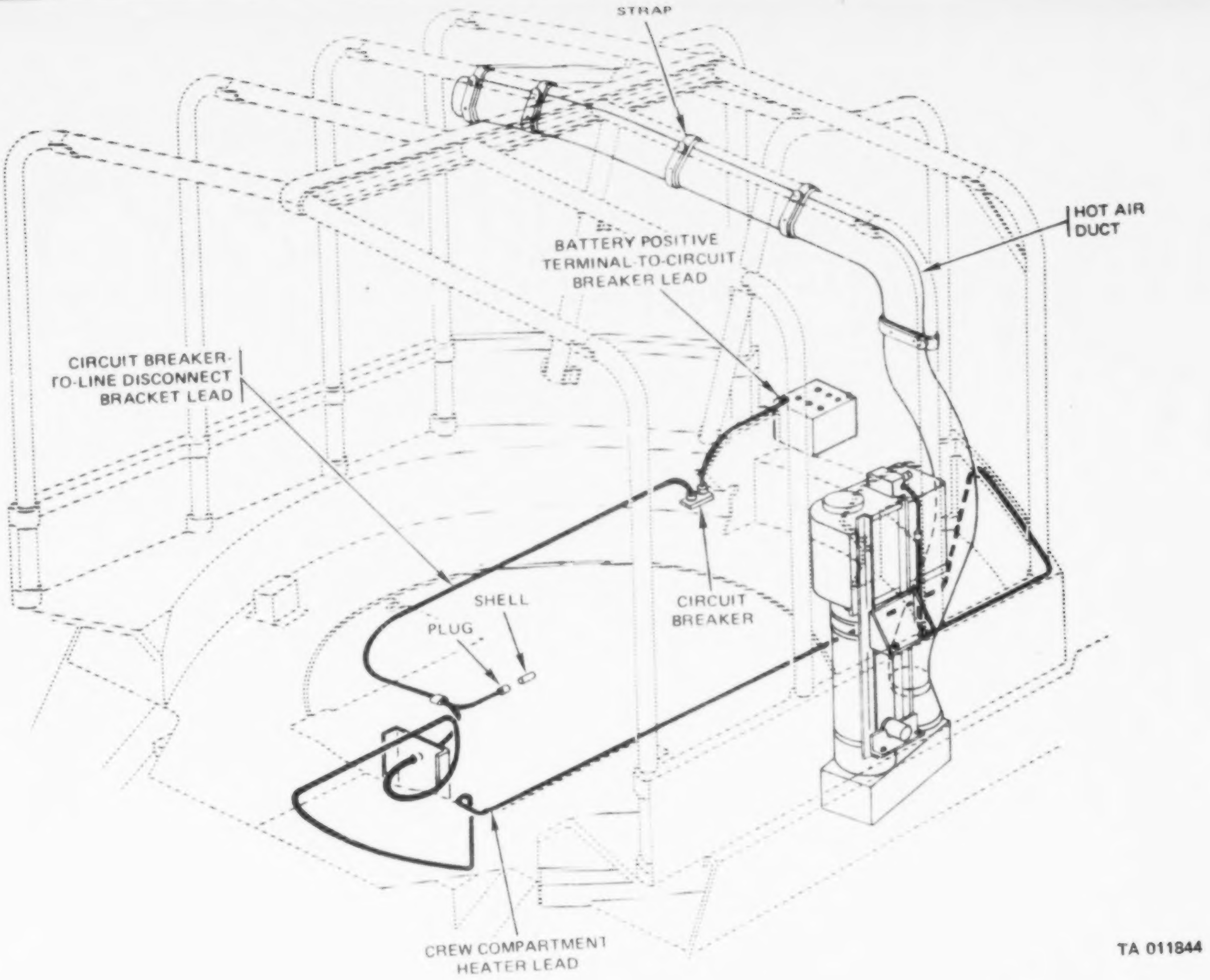
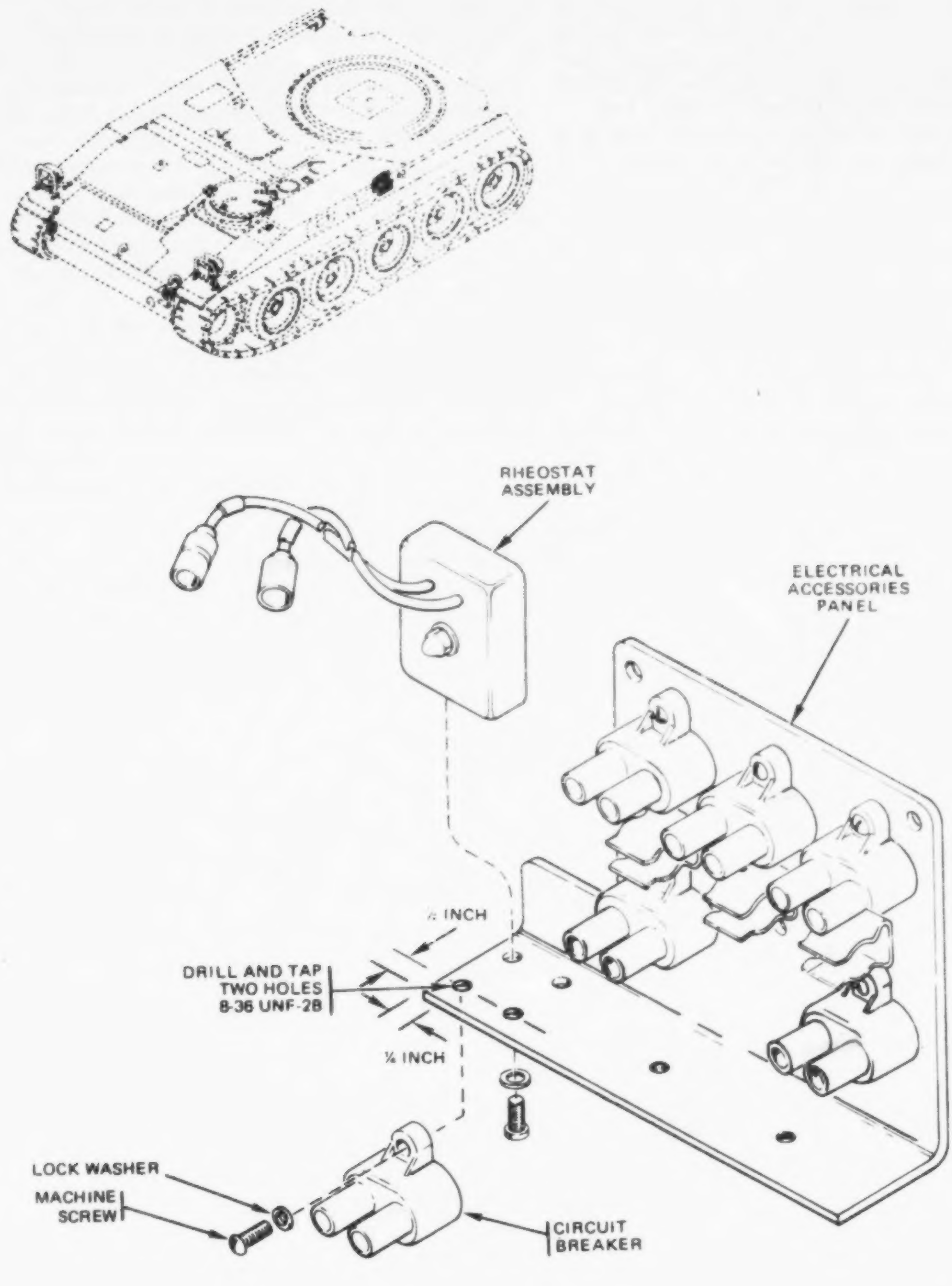

STRAP
HOT AIR DUCT
BATTERY POSITIVE TERMINAL-TO-CIRCUIT BREAKER LEAD
CIRCUIT BREAKER-TO-LINE DISCONNECT BRACKET LEAD
SHELL
PLUG
CIRCUIT BREAKER
CREW COMPARTMENT HEATER LEAD
TA 011844

Figure 23-17. Crew heater kit electrical leads installation.


RHEOSTAT ASSEMBLY
ELECTRICAL ACCESSORIES PANEL
¼ INCH
DRILL AND TAP TWO HOLES 8-36 UNF-2B
¼ INCH
LOCK WASHER
MACHINE SCREW
CIRCUIT BREAKER

TA 011846

Figure 23-18. Crew compartment heater circuit breaker installation.

23-19. Crew Heater Operation Test

a. Fill fuel tank with same grade fuel as used in M107 or M110 vehicle.

b. Refer to operating instructions on front of heater fuel tank.

c. With switch OFF, press in on indicator lamp on face of control box. If lamp glows, there is voltage at the heater control box.

d. Set the heater control-box HI-LO switch to HI.

e. Hold control switch in START position until pilot lamp glows.

f. When pilot lamp comes on, immediately transfer the control switch to RUN, without delay in the OFF position.

NOTE

The control switch must be held in START position until the pilot lamp glows, indicating that flame is established in the heater and that the flame-detector switch has transferred. If the heater is burning, and the switch is transferred too soon, flame will be extinguished.

g. Refer to paragraph 23-31*f* for adjustment procedures.

23-20. Crew Heater Kit Removal

Remove crew heater kit in reverse order of installation. Refer to TM 9-2300-216-20 for removal procedures.

23-21. Crew Heater Kit Repair

Repair crew heater. For repair procedures refer to paragraph 23-31*g* or 23-31*h* for alternate heater.

Section VII. WINTERIZATION KIT

23-22. General

This section contains the instructions for the initial installation, inspection, removal and repair of the winterization kit. These procedures are also applicable to installation of the winterization kit on a vehicle previously equipped with the kit with the exception of those steps requiring the drilling of holes. Part numbers are included in the installation procedures to facilitate identification of the components. Remove the winterization kit components from the packing boxes and make sure all parts are available. For general repair of canvas and webbing, refer to TM 10-269.

23-23. Driver's Enclosure Installation
(Fig. 23-19).

a. Windshield Base Assembly Installation.

(1) Open driver's cupola cover.

(2) Position windshield base assembly (10946639) on cupola located so top edge of base is even with top edge of driver's cupola opening. Grind or cut nylon pads on front base assembly as required for fit against hull.

(3) Drill and tap two ¼-28UNF-2B holes in sides of cupola, using holes at rear of base as a template.

(4) Drill and tap two 10-32UNF-2B holes in front of cupola, using holes in front of base as a template.

(5) Install windshield base assembly and secure with two machine screws (MS35207-268) and flat washers (MS27183-9) at front of base.

(6) Install two cover links (11592926) on side of windshield base assembly and secure link and base to cupola with two machine screws (MS35207-280) and flat washers (MS27183-10).

(7) Drill and tap a ¾-16UNF-3B hole through top of hull adjacent to cupola opening 4-½ inches in front of left rear base attaching screw. Install grommet (10892321) in tapped hole.

NOTE

When winterization kit is removed from vehicle, install plug (MS39071-8S) in ¾-inch tapped hole.

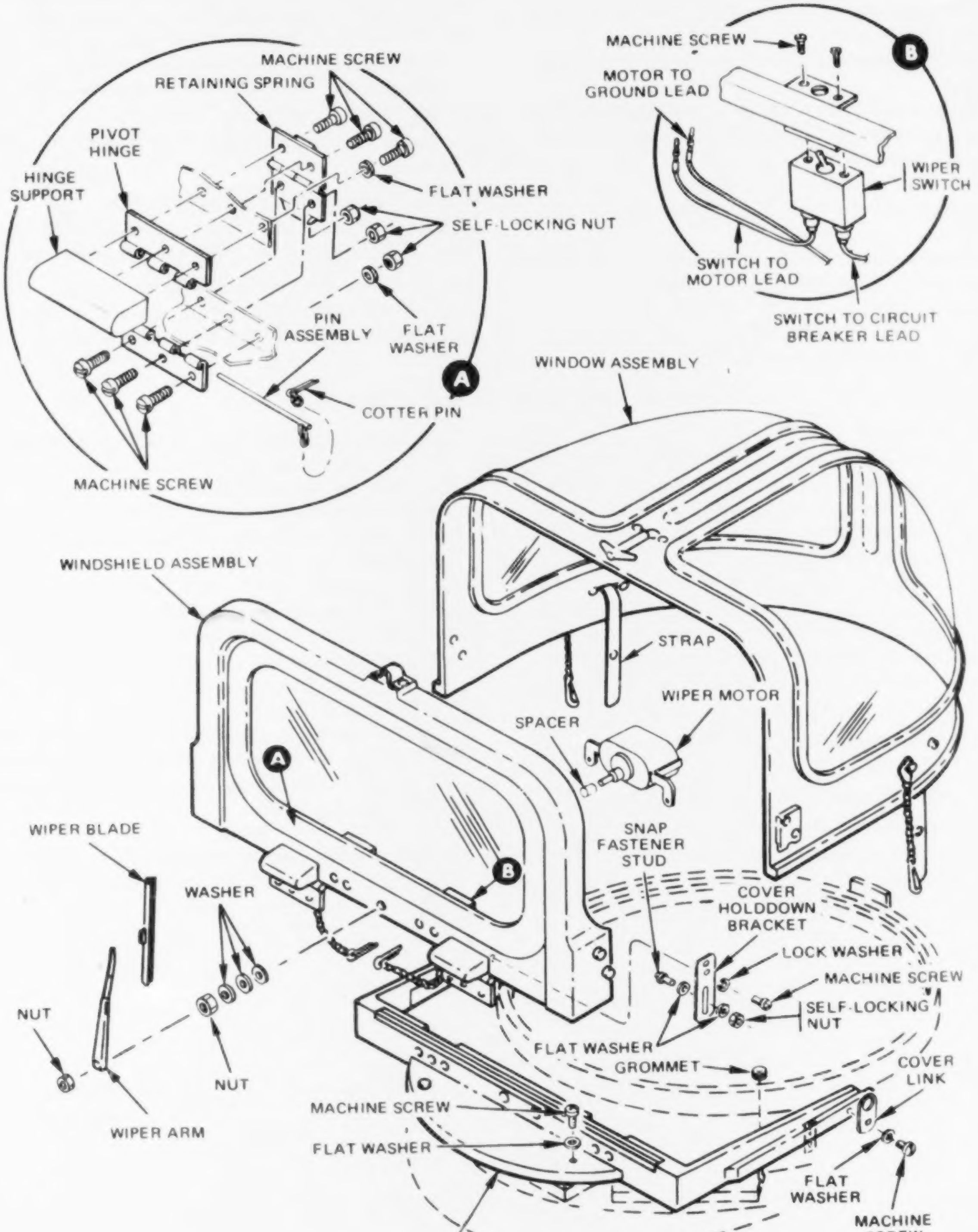

MACHINE SCREW
RETAINING SPRING
PIVOT HINGE
HINGE SUPPORT
FLAT WASHER
SELF-LOCKING NUT
PIN ASSEMBLY
FLAT WASHER
A
COTTER PIN
MACHINE SCREW
MACHINE SCREW
B
MOTOR TO GROUND LEAD
WIPER SWITCH
SWITCH TO MOTOR LEAD
SWITCH TO CIRCUIT BREAKER LEAD
WINDOW ASSEMBLY
WINDSHIELD ASSEMBLY
STRAP
WIPER MOTOR
SPACER
A
B
SNAP FASTENER STUD
WIPER BLADE
WASHER
COVER HOLDDOWN BRACKET
LOCK WASHER
MACHINE SCREW
SELF-LOCKING NUT
NUT
FLAT WASHER
GROMMET
COVER LINK
NUT
MACHINE SCREW
WIPER ARM
FLAT WASHER
FLAT WASHER
MACHINE SCREW
WINDSHIELD BASE ASSEMBLY
TA 011846

Figure 23-19. Driver's enclosure installation.

b. Windshield Assembly Installation.

(1) Place spacer (11592918) on wiper motor shaft and install wiper motor (8385276) on inside of windshield. Install rubber washer, flat washer, lock washer on motor shaft on outside of windshield and secure with nut supplied with motor.

(2) Install wiper blade (MS53048-7) and arm (MS53049-1) on motor shaft and secure with cap nut supplied with arm (MS35691-29).

(3) Position one half of pivot hinge (10946641) and hinge support (10946642) on outside of windshield and retaining spring (7432456) on inside of windshield and secure with three machine screws (MS35207-265) and one flat washer (MS27183-9). Install second hinge in same manner.

(4) Install wiper switch (MS39061-1) with OFF position at left side on windshield assembly left inside bracket and secure with two machine screws (MS35206-243).

(5) Install lower half of pivot hinges and secure with pin and chain assembly (10956409). Insert chain through hole in windshield lower frame and secure with cotter pin (MS24665-509).

(6) Install assembled windshield assembly on base and secure with six machine screws (MS35207-264), six self-locking nuts (MS21083N3) and two flat washers (MS27183-9) through lower pivot hinge and retaining springs.

(7) Install short switch-to-motor lead (10946644) to wiper motor positive terminal and to wiper switch. Connect motor-to-ground lead (11592901) to wiper motor negative terminal. Connect switch-to-circuit breaker lead (10946645) to wiper switch. Place circuit breaker and motor ground leads through clip on left retaining spring and route leads down between base assembly and hull, through grommet in ¾-inch tapped hole in side of cupola and into driver's compartment. Connect motor ground lead to hull with screw securing dome light. Route switch-to-circuit breaker lead along hull wiring harness to left rear of driver's compartment and connect to spare 15-ampere circuit breaker.

c. Window Assembly Installation.

(1) Install window assembly (10946629) over driver's cupola and against windshield. Secure window to windshield with latch.

(2) Pull window straps down and use as templates to locate two cover holddown brackets (11592832) on inside of driver's compartment. Position brackets so strap fastener is approximately centered in bracket slot.

(3) Use bracket as template and drill and bottom tap bracket mounting holes 10-32UNF-2B ⅜-inch deep.

(4) Install snap fastener stud (MS27977-37B) in holddown bracket and lightly secure with two flat washers (MS27183-9) and self-locking nut (MS21044N3).

(5) Install holddown bracket assemblies on hull and secure with lock washer (MS35338-43) and machine screw (MS35207-262).

(6) Close window assembly and adjust location of snap fastener studs in cover holddown bracket so that window assembly seal is compressed when window straps are fastened to studs.

(7) Secure window chains to cover links.

23-24. Coolant Heater Installation

(Fig. 23-20)

a. Battery Box Installation.

(1) Open battery access cover.

(2) Remove battery protection cover, holddown channels, batteries, battery tray and battery tray supports. Tag and return to supply: battery protection cover, front holddown channel, battery tray and battery tray supports.

(3) Install two grommets (MS35490-69) in hull at forward right side of battery compartment.

(4) Install battery box-to-engine coolant supply elbow hose (11643053-12) through lower hull grommet. Install battery box-to-tube hose (11643053-9) through upper hull grommet.

(5) Install two battery tray supports (10881923) in battery compartment.

(6) Position battery box (10956766), with hose nipples on underside forward, near battery compartment.

(7) Install battery box-to-engine coolant supply elbow hose to left battery box nipple and secure with clamp (MS35842-11). Install battery box-to-tube hose to right battery box nipple and secure with hose clamp (MS35842-11).

(8) Install battery box, batteries and battery cables.

(9) Install battery box cover channel (11592921) at second from front battery holddown position. Install three battery holddown channels removed with batteries ((2) above).

(10) After electrical lead installation (*b* below) install battery box cover (10956768) over batteries and close battery box cover.

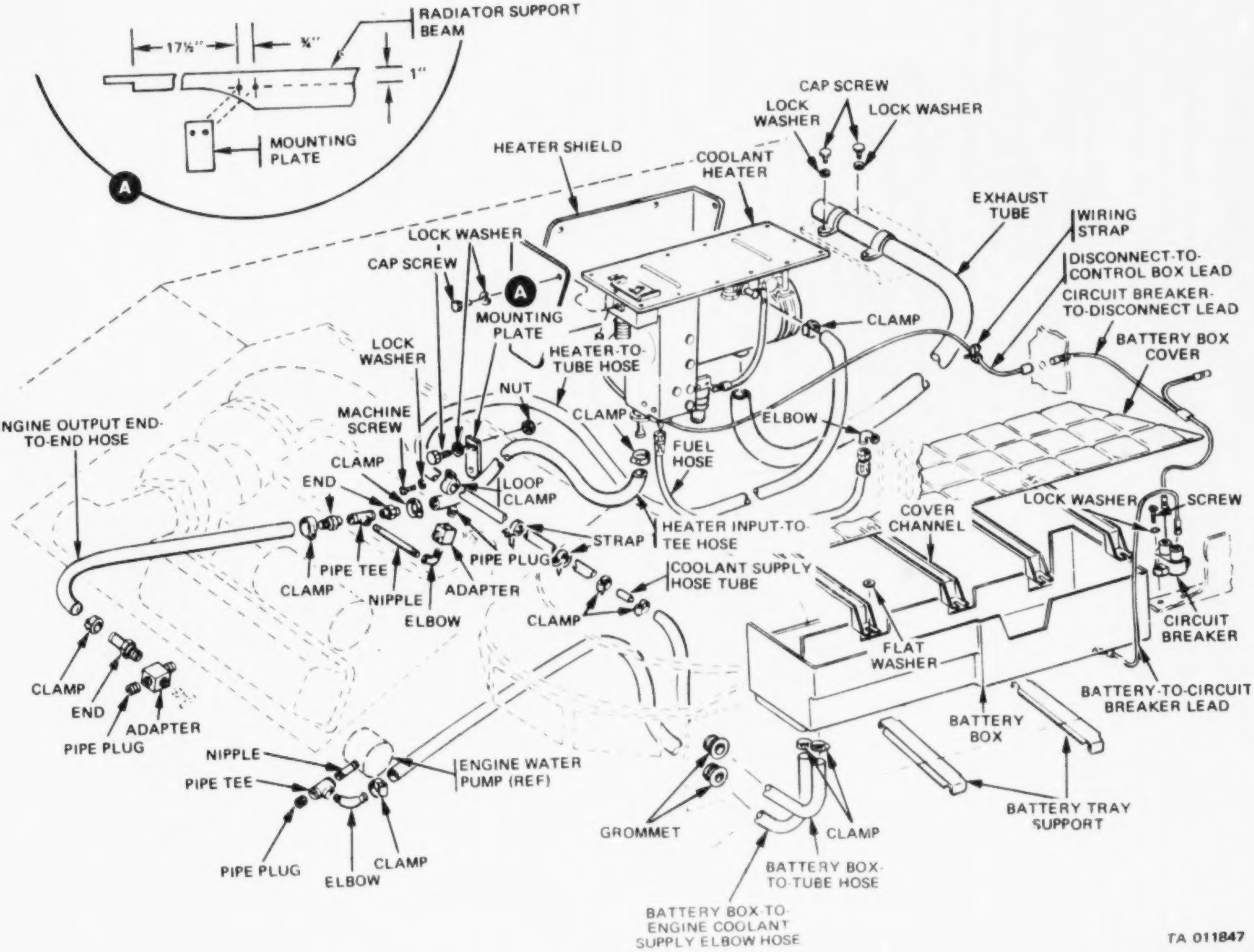

RADIATOR SUPPORT BEAM
17½"
¾"
1"
MOUNTING PLATE
A
HEATER SHIELD
COOLANT HEATER
CAP SCREW
LOCK WASHER
LOCK WASHER
EXHAUST TUBE
WIRING STRAP
DISCONNECT-TO-CONTROL BOX LEAD
CIRCUIT BREAKER-TO-DISCONNECT LEAD
BATTERY BOX COVER
LOCK WASHER
CAP SCREW
A
MOUNTING PLATE
HEATER-TO-TUBE HOSE
CLAMP
LOCK WASHER
NUT
MACHINE SCREW
ENGINE OUTPUT END-TO-END HOSE
CLAMP
CLAMP
ELBOW
END
LOOP CLAMP
FUEL HOSE
HEATER INPUT-TO-TEE HOSE
STRAP
PIPE PLUG
COOLANT SUPPLY HOSE TUBE
LOCK WASHER
SCREW
COVER CHANNEL
PIPE TEE
CLAMP
NIPPLE
ADAPTER
ELBOW
CLAMP
FLAT WASHER
CIRCUIT BREAKER
BATTERY-TO-CIRCUIT BREAKER LEAD
BATTERY BOX
CLAMP
END
ADAPTER
PIPE PLUG
NIPPLE
PIPE TEE
ENGINE WATER PUMP (REF)
PIPE PLUG
ELBOW
CLAMP
GROMMET
CLAMP
BATTERY BOX-TO-TUBE HOSE
BATTERY BOX-TO-ENGINE COOLANT SUPPLY ELBOW HOSE
BATTERY TRAY SUPPORT
TA 011847

Figure 23-20. Coolant heater, hoses, fittings and related parts installation.

b. *Electrical Lead and Circuit Breaker Installation* (fig. 23-21).

(1) Remove left and right CO_2 bottle access covers. Tag and return covers to supply.

NOTE

On the M107 Gun Vehicles serial 1 through 304 and the M110 8-Inch Howitzer Vehicles serial 1 through 427, the electric accessories panel is mounted as shown on figure 23-21. On all subsequent vehicles the panel must be removed and mounted as shown for installation of the circuit breaker.

(2) If rheostat assembly is mounted on underside of electrical accessories panel, remove and install on top side of panel.

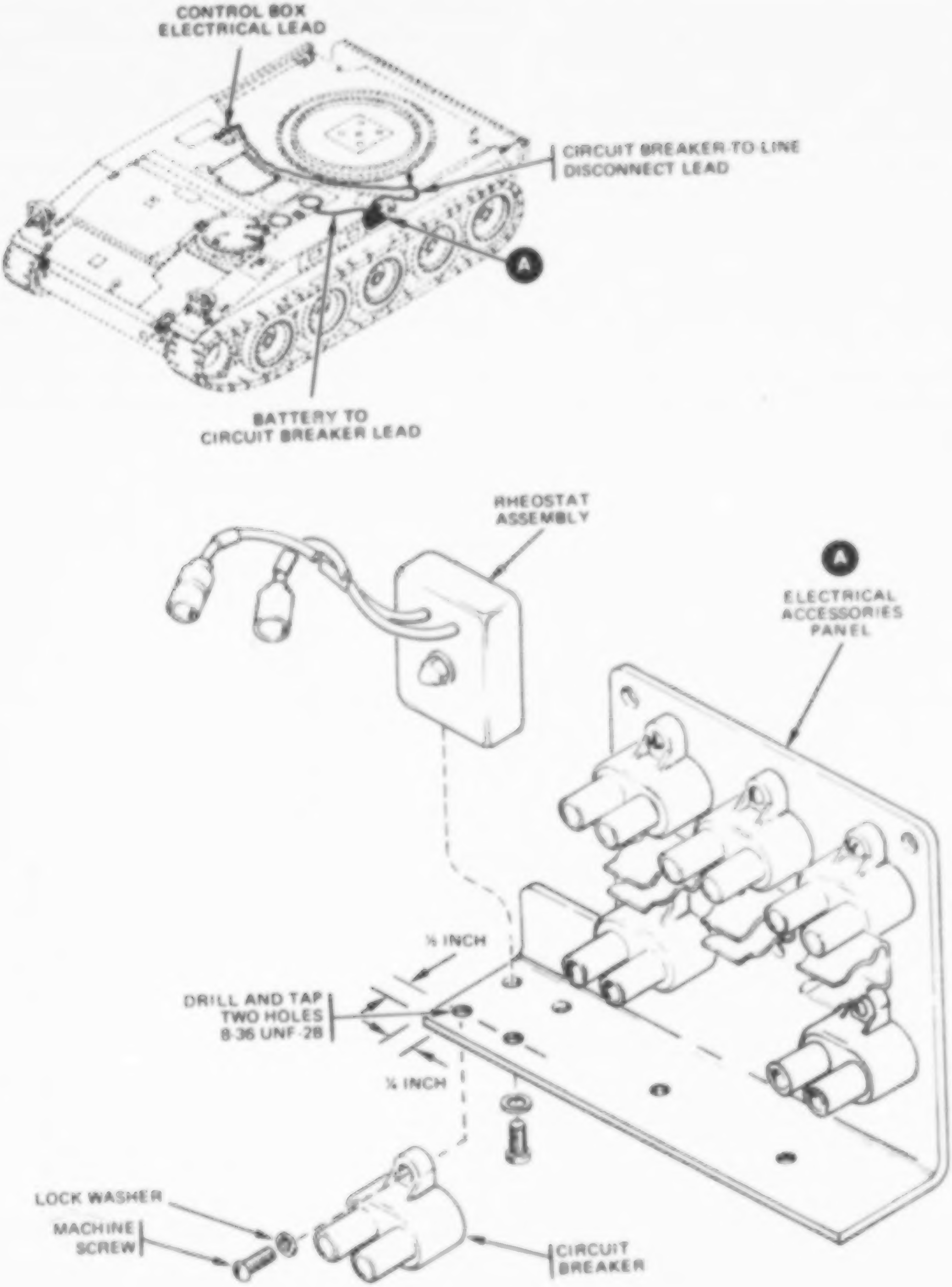
(3) Use circuit breaker (M13516/1-4) as template and drill and tap two 8-36UNF-2B holes in rear outside edge of electrical accessories panel in accordance with dimensions on figure 23-21.

(4) Install circuit breaker on underside of electrical accessories panel and secure with two lock washers (MS35338-38) and screws (MS35266-47).

(5) Connect battery-to-circuit breaker lead (10934557) to circuit breaker and route lead to rear battery. Attach lead to screw on positive terminal of rear battery.

(6) Connect circuit breaker-to-disconnect lead (10882042) to circuit breaker and route lead to turret well. Use strap (10946660) as required to secure lead.

(7) Attach disconnect-to-control box lead (10934556) to circuit breaker lead. Route lead across bottom of turret well to right side of vehicle and up and forward along underside of deck to right hull access cover. Use straps (10921769) as required to secure lead.


CONTROL BOX ELECTRICAL LEAD
CIRCUIT BREAKER TO LINE DISCONNECT LEAD
A
BATTERY TO CIRCUIT BREAKER LEAD
RHEOSTAT ASSEMBLY
A
ELECTRICAL ACCESSORIES PANEL
½ INCH
DRILL AND TAP TWO HOLES 8-36 UNF-2B
¼ INCH
LOCK WASHER
MACHINE SCREW
CIRCUIT BREAKER

TA 011848

Figure 23-21. Coolant heater electrical lead and circuit breaker installation.

c. Hoses and Tubes Installation (fig. 23-20).

(1) Remove spare track shoes from top of hull access cover and stow in shelter left rear stowage compartment. Remove spare track clamp over hull access cover and remove cover. Tag clamp and cover and return to supply. Retain 14 screws and lock washers. Remove engine and transmission deck assemblies.

(2) Remove plug from top of engine water pump or, if driver's heater is installed, disconnect heater hose and remove output hose end from water pump.

(3) Install nipple (MS51953-75) in engine water pump. Install pipe tee (144085) on nipple. Install elbow (MS24519-7) in left opening of tee. If driver's heater is installed, install output hose end in tee and connect driver's heater hose on end and secure with clamp. If driver's heater is not installed, install plug removed from engine water pump into tee. Connect battery box-to-engine coolant supply elbow hose (11643053-12) to elbow and secure with clamp (MS35842-11).

(4) Remove engine block drain cock from right front (vehicle orientation) of engine and install adapter (10934640). Install engine drain cock in adapter. Install plug (MS49005-6) in adapter end. Install hose end (8712438) in right side of adapter. Install engine output-to-tee hose (11643053-2) on hose end and secure with clamp (MS35842-11). Route hose along right side of engine with a minimum of two inches clearance with exhaust pipe.

(5) Remove engine block drain cock from right rear (vehicle orientation) on engine and install adapter (10934640). Install drain cock in side of adapter. Install plug (MS49005-6) in end of adapter. Install elbow (MS39230-4) in side of adapter and install nipple (MS51953-87) in elbow. Install pipe tee (144085) on nipple and install two hose ends (8712438) in pipe tee. Connect engine output-to-tee hose to forward hose end and secure with clamp (MS35842-11). Connect heater output-to-tee hose (11643053-9) to hose end and secure with clamp (MS35842-11). Route hose to right side vehicle recess with a minimum of two inches clearance with exhaust pipe.

(6) Use mounting plate (10934561) as template. Locate and drill two $^{5}/_{16}$-inch holes in right end of radiator support beam in accordance with dimensions shown in view A, figure 23-20. Position mounting plate on radiator support beam and secure plate with two cap screws (MS90726-6), lock washers (MS35338-44) and nuts (MS51968-2).

(7) Install coolant supply hose tube (10934571) in end of battery box-to-tube hose and secure with hose clamp (MS35842-11). Install end of heater-to-tube hose (11643053-7) on coolant supply hose tube and secure with hose clamp. Route heater-to-tube hose along top front of radiators and secure hose to mounting plate (10934561) with loop clamp (MS21919G15), lock washer (MS35338-43) and machine screw (MS35207-260). Tie hose in position with straps (10921769). Route hose to right side vehicle recess.

(8) Remove plug from side of fuel cell located at top of cell in vehicle right side recess. Install elbow (MS51815-33) in fuel cell and attach fuel hose (10911012) to elbow. Route fuel hose forward. Tag and secure plug to fuel hose.

(9) Install coolant heater exhaust tube (10946610) in hull recess to exhaust through exhaust port and secure to hull with four lock washers (MS35338-44) and four cap screws (MS90726-3).

d. Coolant Heater Installation (fig. 23-20).

(1) Position heater shield (10946576) on heater right side and secure with four lock washers (MS35338-44) and four cap screws (MS90726-2).

(2) Place coolant heater assembly adjacent to hull recess and connect fuel hose (10911012) to heater fuel pump. Connect heater-to-tube hose (11643053-7) to heater input hose tube at top rear of heater and secure hose with clamp (MS35842-11). Connect heater output-to-hose end hose (11643053-9) to heater output hose tube adjacent to fuel hose and secure hose with clamp (MS35842-11).

(3) Position heater control box start switch to OFF position. Connect disconnect-to-control box lead (10934556) to heater control box lead.

(4) Position coolant heater assembly in hull recess and make sure that exhaust tube and heater exhaust connections mate. Secure heater assembly to hull with 14 lock washers and screws removed with hull access cover (c (1) above).

23-25. Crew Shelter Installation

Install crew shelter. For installation procedures, refer to paragraphs 23-12 and 23-14.

23-26. Crew Heater Installation

Install crew heater. For installation procedures, refer to paragraph 23-18.

23-27. Hull Covers, Plates and Related Parts Installation

(Fig. 23-22)

a. Air Vent Cover. Close battery compartment access door. Install two air vent covers (10934641) over top openings in access door. Secure each cover with four lock washers (MS35338-44) and screws (MS90725-3).

b. CO_2 Bottle Access Cover. Winterize two CO_2 cylinders in accordance with specification MIL-E-468. Install CO_2 bottle access cover (10882030-1) on left and right CO_2 cylinder access openings and secure with lock washers and screws used to secure access cover removed in paragraph 23-24b (1) above.

c. Radiator Intake Cover. Remove hull fan well deck assembly from hull. Locate points on top flange of fan-well deck assembly in accordance with figure 23-23, and drill and tap twelve holes 8-32UNC-2B. Install 12 snap fasteners (MS27977-33B) with flat washers

(MS27183-7) as required to raise snap fasteners above radiator intake cover (usually three). Install hull fan well deck to hull. Install radiator intake cover (10882031) over hull fan well deck and secure to snap fasteners.

d. Exhaust Port Plate. Position heater exhaust port plate (10946372) on outside lower half of second from rear exhaust port grille and with cutout over coolant heater exhaust tube. Install two lock plates (10946361) on inside of grille and secure port plate and lock plates with two flat washers (MS27183-11) and two screws (MS90726-10).

e. Exhaust Port Covers.

(1) Install seven cover brackets (10946357) on outside bottom of seven exhaust port grilles, omitting second from rear grille, and install seven lock plates (10946361) on inside of exhaust port grilles. Secure brackets together with flat washers (MS27183-11) and screws (MS90726-10).

(2) Roll up rear hull exhaust port cover (10946605) and position on top of right fender over rear exhaust port grilles. Secure to top of grilles with four lock plates (10946361) on inside of grilles, four flat washers (MS27183-11) and four screws (MS90726-10). Unroll cover and install two cover cords (10946356) on cover and secure cover to hull with cord looped over cover brackets.

(3) Use strap loop as template and locate two points on right fender in accordance with dimensions in A, figure 23-22, and drill and tap two 10-32UNF-2B holes in top of fender. Secure strap loop to fender with two flat washers (MS27183-9) and screws (MS35207-256).

(4) Roll up front hull exhaust port cover (10946603) and position on top of right front fender over front exhaust port grilles. Secure cover to top of three grilles with three lock plates (10946361) on inside of hull, three flat washers (MS27183-11) and three screws (MS90726-10). Unroll cover and install two cover cords (10946356) in cover and secure cover to hull with cord looped over cover brackets and to strap loop.

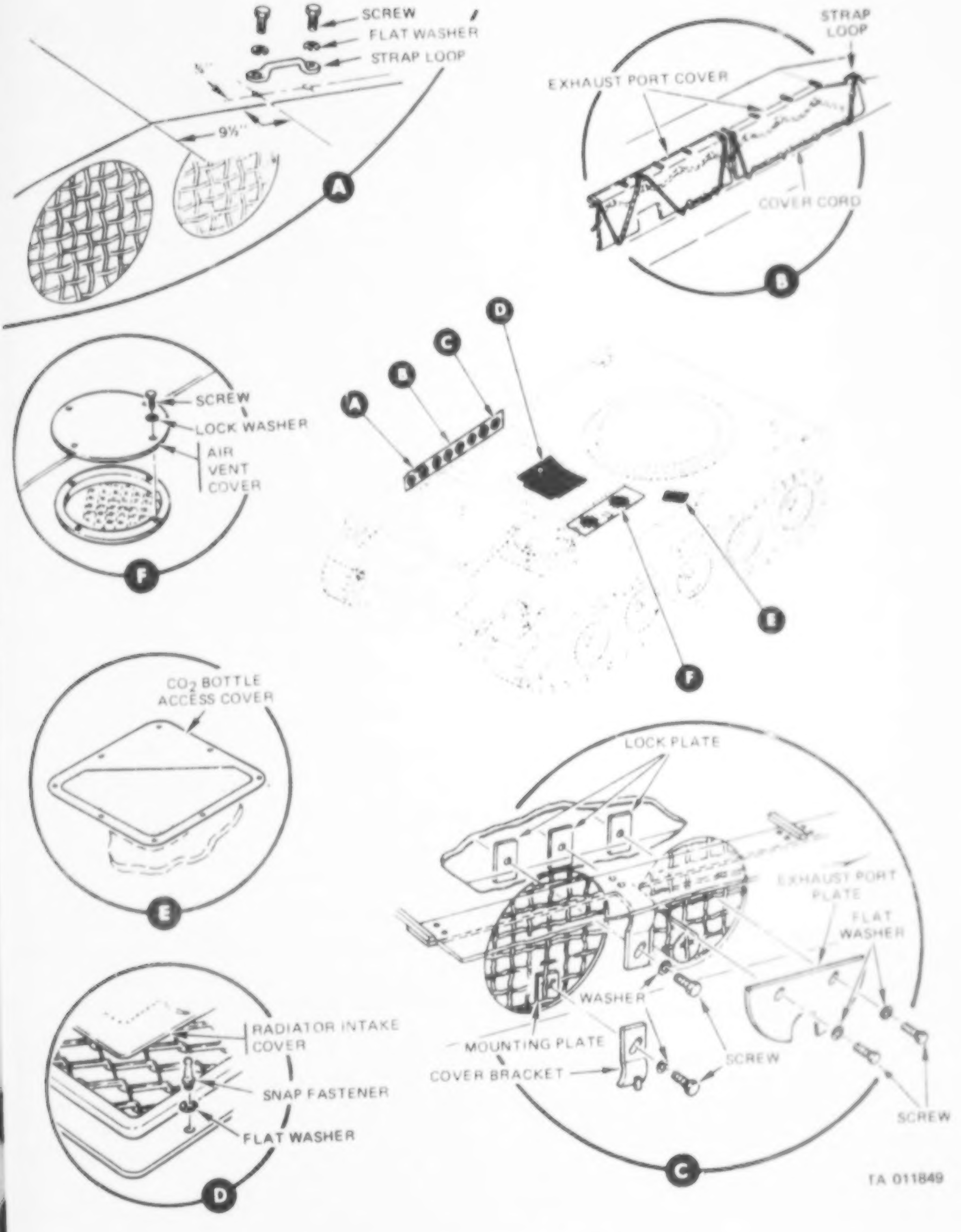

SCREW
FLAT WASHER
STRAP LOOP
⅝''
9½''
A
STRAP LOOP
EXHAUST PORT COVER
COVER CORD
B
D
C
B
A
E
F
SCREW
LOCK WASHER
AIR VENT COVER
F
CO2 BOTTLE ACCESS COVER
E
LOCK PLATE
EXHAUST PORT PLATE
FLAT WASHER
WASHER
MOUNTING PLATE
COVER BRACKET
SCREW
SCREW
C
RADIATOR INTAKE COVER
SNAP FASTENER
FLAT WASHER
D
TA 011849

Figure 23-22. Hull covers, plates and related parts installation.

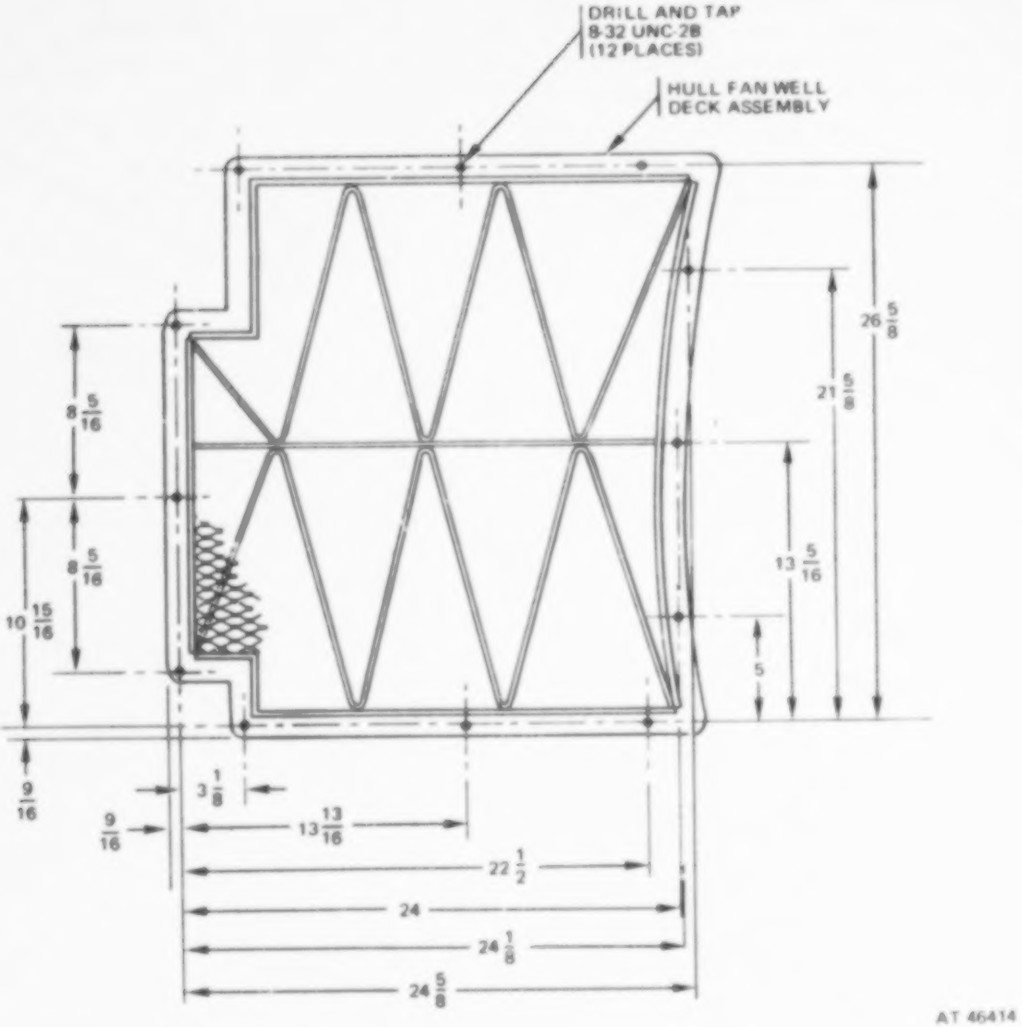

DRILL AND TAP
8-32 UNC-2B
(12 PLACES)
HULL FAN WELL
DECK ASSEMBLY
26 5/8
21 5/8
13 5/16
5
8 5/16
8 5/16
10 15/16
9/16
9/16
3 1/8
13 13/16
22 1/2
24
24 1/8
24 5/8
AT 46414

Figure 23-23. Radiator intake grille cover snap fastener installation.

23-28. Inspection After Installation

a. Close driver's closure window and make sure window is sealed against base.

b. Operate windshield wiper and adjust arm swing if required.

c. Operate coolant heater. Check all hose and tube connections for leaks. Check heater for fuel leaks. Check operation of heater and check that battery box is receiving heated coolant. Check vehicle coolant level and refill as required.

d. Operate crew heater. Check operation of heater and heater deflector. Check heater for fuel leaks. Check and fill fuel tank as required.

e. Check all covers and plates for security of installation.

23-29. Winterization Kit Maintenance

a. General. Maintenance of the winterization kit consists of inspecting and troubleshooting the kit after installation, and the normal maintenance to keep the winterization kit components in serviceable condition. The crew heater may need adjustment after initial installation. For crew heater adjustment procedures refer to paragraph 23-31g(6).

b. Troubleshooting. Troubleshoot the winterization kit in accordance with Table 23-3.

Table 23-3. Troubleshooting the Winterization Kit

LFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

WINDSHIELD WIPER

WINDSHIELD WIPER DOES NOT OPERATE WHEN SWITCH IS TURNED ON.

Step 1. Check that MASTER switch is turned ON.
Turn MASTER switch to ON, if required.

Step 2. Check that windshield wiper electric lead is connected to circuit breaker behind driver's seat.
Connect lead to circuit breaker, if loose or disconnected.

Step 3. Check for 24 vdc at circuit breaker.
Disconnect windshield wiper lead from circuit breaker.
Set multimeter at 50 to 100 vdc to measure 24 vdc.
Connect black probe to vehicle for ground.
Connect red probe to circuit breaker.
a. If meter reads 24 v/dc, reconnect lead and go to step 4.
b. If meter reads zero, replace circuit breaker (TM 9-2300-216-20). Connect lead.

Step 4. Check continuity of windshield wiper lead.
Zero multimeter.
Disconnect windshield wiper lead from circuit breaker and switch.
Connect meter probes to both terminals of lead.
a. If meter reads 0 ohms, reconnect lead and go to step 5.
b. If meter needle does not move, replace lead.

Step 5. Check continuity of windshield wiper switch.
Zero multimeter.
Disconnect both leads from switch.
Connect meter probes to both terminals of switch and turn switch ON.
a. If meter reads 0 ohms, replace windshield wiper motor (para 23-25*b*(1)(2)). Connect lead to switch.
b. If meter needle does not move, replace switch (para 23-23*b*(4)). Connect leads.

COOLANT HEATER

1 HEATER WILL NOT START. PRESS-TO-TEST INDICATOR WILL NOT LIGHT.

Step 1. Check that MASTER SWITCH is turned ON.
Turn MASTER switch to ON, if required.

Step 2. Check for 24 vdc at circuit breaker on electrical accessories panel (fig. 23-21).
Remove left side CO2 access cover.
Disconnect battery lead (10934557) from coolant heater circuit breaker on accessories panel.
Set multimeter to 50 or 100 vdc to measure 24 vdc.
Connect black probe to vehicle for ground.
Connect red probe to battery lead.
a. If meter reads 24 vdc, connect lead to circuit breaker and go to step 3.
b. If meter reads zero, connect lead and troubleshoot battery circuits (TM 9-2300-216-20).

Step 3. Check circuit breaker for 24 vdc.
Disconnect coolant heater lead (10882042) from circuit breaker.
Set multimeter at 50 or 100 vdc to measure 24 vdc.
Connect black probe to vehicle for ground.
Connect red probe to circuit breaker terminal.
a. If meter reads 24 vdc, reconnect lead and go to step 4.
b. If meter reads zero, replace circuit breaker (para 23-24*b*(4)). Connect lead.

Step 4. Check continuity of coolant heater leads (10882042 and 10934556).
Remove 14 screws and lock washers securing coolant heater to hull and lift heater to top of hull.
Zero multimeter.
Connect one meter probe to terminal of lead (10882042) at accessory panel. Disconnect lead (10934556) from heater control box and connect second probe to lead terminal.
a. If meter reads 0 ohms, connect lead and go to step 5.
b. If meter needle does not move, repair or replace leads. Install coolant heater and secure with 14 screws and lock washers.

Step 5. Check ground lead connection of wiring harness (11617762) at bottom of mounting plate for tightness and corrosion.
a. If connection is loose, tighten connection.
b. If connections shows rust or corrosion, remove nut, washer and screw securing lead to mounting plate. Remove all paint, rust and corrosion from plate and terminal. Reinstall and secure ground lead, making sure that there is a solid metal to metal contact.
c. Install coolant heater and secure with 14 screws and lock washers.

Step 6. Check for 24 vdc through coolant heater control box.
Set multimeter to 50 or 100 vdc to measure 24 vdc.
Disconnect wiring harness (11617762) from control box.
Make sure power lead is connected to control box.
Turn MASTER switch to ON.
Connect black probe to vehicle for ground.

Table 23-3. Troubleshooting the Winterization Kit — Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

COOLANT HEATER — Continued

Step 6. Continued

Place control box switches in positions indicated in following chart and check each outlet connector pin listed for 24 v/dc with red probe.

Start — Run Switch Position	Hi — Low Switch Position	24 v/dc Required at Outlet Connector Pins
START	HI	A, B, C, D
START	LO	A, C, D
RUN	HI	A, B, D
RUN	LO	A, D

a. If meter reads 24 v/dc on all connector pins, reconnect harness and go to step 7.

b. If meter reads zero on any one of above pins, replace heater control box (para 23-31*d*). Reconnect wiring harness.

Step 7. Check continuity of all circuits in wiring harness (11617762).

Disconnect harness from control box, from heater, and from fuel pump.

Zero multimeter.

At wiring harness control box connector, connect one multimeter probe to circuit 402R, socket A, and, in turn, connect second probe to fuel pump socket and to coolant pump terminal. Check continuity.

Check each wire in harness in turn at sockets in connectors:

Circuit 401, C socket; circuit 402, B socket, circuit 410, E socket; and circuit 411, D socket.

a. If meter reads 0 ohms at all circuits, replace heater (para 23-24). Connect harness to fuel pumps, heater and control box.

b. If meter needle does not move on any circuit, repair or replace harness. Connect harness to fuel pump heater and control box.

2. HEATER STARTS BUT IGNITION TIME IS EXCESSIVE.

Step 1. If smoke shows at heater exhaust for more than 5 minutes, check electrolite in batteries for low battery charge.

Charge or replace batteries (TM 9-2300-216-20).

Step 2. Igniter may be fouled with carbon due to operation with heater switch in LOW position.

Provide fully charged battery and start heater. Operate heater in HI position to clean igniter. Leave switch in HI position as heater will automatically reduce to low if heater is too hot.

Step 3. Check heater leads for tight connections or corroded connections.

a. Tighten loose connections.

b. Disconnect, clean and reconnect corroded connections.

Step 4. Check heater ground lead connection of wiring harness (11617762) at bottom of mounting plate for tightness and corrosion.

Turn heater switch to OFF.

Remove 14 screws and lock washers securing coolant heater to hull and lift heater to top of hull for access to lead.

a. If connection is loose, tighten connection.

b. If connection shows rust or corrosion, remove nut, washer and screw securing lead to mounting plate. Remove all paint, rust and corrosion from plate and terminal. Reinstall and secure ground lead, making sure there is a solid metal to metal contact.

c. Install coolant heater and secure with 14 screws and lock washers.

Step 5. Check fuel supply for low fuel.

Fill fuel cell if cell is low or empty.

Step 6. Check for faulty heater fuel pump.

Turn heater switch to OFF.

Lift coolant heater to top of hull (step 4 above).

Provide suitable container of 1 pint or more.

Disconnect pump-to-heater fuel hose at heater.

Turn heater switch to ON and measure amount of fuel pumped into container for 10 seconds. Dispose of fuel.

a. If flow is approximately ½ pint (1 cup), pump is working properly. Connect pump-to-heater fuel hose at heater. Install coolant heater and secure with 14 screws and lock washers.

b. If flow is less than ½ cup, replace fuel pump (para 23-31*d*). Connect pump-to-heater fuel hose at heater. Install coolant heater and secure with 14 screws and lock washers.

c. If heater will still not operate, replace heater (para 23-31*d*).

3. COOLANT DOES NOT CIRCULATE THROUGH ENGINE DURING PREHEAT PERIOD.

Step 1. Check for cold-soaked engine. Heater will not pump coolant containing slush or particles of ice.

Move vehicle into protected area where vehicle can warm up to 0°F., or higher.

Step 2. Check for 24 v/dc at coolant pump terminal.

Turn heater switch to OFF.

Remove 14 screws and lock washers securing coolant heater to hull and lift heater to top of hull.

Disconnect coolant pump electrical lead from pump.

Set multimeter at 50 or 100 v/dc to measure 24 v/dc.

Connect black probe to vehicle for ground and connect red probe to pump lead. Turn heater switch to ON.

Table 23-3. Troubleshooting the Winterization Kit — Continued

ALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

COOLANT HEATER — Continued

Step 2. Continued

a. If meter reads 24 vdc, reconnect lead and to to step 3. When malfunction is
b. If meter reads zero, troubleshoot coolant heater electrical circuits (Malfunction 1 above).
corrected, install coolant heater and secure with 14 screws and lock washers.

Step 3. ***Check continuity of coolant pump***
Zero Multimeter
Disconnect power lead and ground lead from pump
Connect meter probes to both terminals of pump
a. If meter reads 0 ohms, reconnect leads and go to step 4.
b. If meter needle does not move, replace coolant pump. Connect lead. Install coolant heater and secure with 14
screws and lock washers.

Step 4. ***Check for defective coolant pump***
Turn heater switch to OFF
Lift coolant heater to top of hull (step 2 above)
Provide suitable container of 2 to 5 gallon capacity
Disconnect coolant hose from outlet port of coolant pump
Turn heater switch to ON
a. If pump discharges 1 to 1-½ gallon of coolant per minute, reconnect hose and troubleshoot cooling system (TM
9-2300-216-20). Install coolant heater and secure with 14 screws and lock washers. Dispose of coolant.
b. If pump does not discharge coolant, replace coolant pump (para 23-13*d*). Install coolant heater and secure with
14 screws and lock washers.

CREW HEATER

1. HEATER WILL NOT START, PRESS-TO-TEST INDICATOR WILL NOT LIGHT

Step 1. ***Check that MASTER switch is turned ON***
Turn **MASTER** switch to ON, if required.

Step 2. ***Check for 24 vdc at circuit breaker on electrical accessories panel (fig. 23-18)***
Remove left side CO_2 access cover
Disconnect battery lead (10934577) from coolant heater circuit breaker
Set multimeter to 50 or 100 vdc to measure 24 vdc
Connect black probe to vehicle for ground
Connect red probe to battery lead
a. If meter reads 24 vdc, connect lead to circuit breaker and go to step 3.
b. If meter reads zero, troubleshoot battery circuits (TM 9-2300-216-20). When trouble is corrected, install CO_2 access cover.

Step 3. ***Check circuit breaker for 24 vdc***
Disconnect crew heater lead (10882042) from circuit breaker
Set multimeter at 50 or 100 vdc to measure 24 vdc
Connect black probe to vehicle for ground
Connect red probe to circuit breaker terminal
a. If meter reads 24 vdc, reconnect lead and go to step 4.
b. If meter reads zero, replace circuit breaker (para 23-24*b*(4)). Connect lead and install CO_2 access cover.

Step 4. ***Check continuity of crew heater leads (10882042 and 10882043)***
Zero multimeter.
Disconnect lead (10882042) from circuit breaker and connect one meter probe to terminal of lead. Disconnect lead (10882043)
from crew heater control box and second probe to lead terminal.
a. If meter reads 0 ohms, go to step 5.
b. If meter needle does not move, repair or replace leads. Connect leads and install CO_2 access cover.

Step 5. ***Check ground lead connection of crew heater wiring harness (10934482) at support bracket for tightness and corrosion***
a. If connection is loose, tighten connection.
b. If connection shows rust or corrosion, remove screw and washer securing ground lead to support bracket.
Remove all paint rust, and corrosion from bracket, screw and terminal. Reinstall and secure ground lead, making sure there is a solid metal to metal contact.
c. Install CO_2 access cover.

Step 6. ***Check for 24 vdc through coolant heater control box***
Set multimeter to 50 to 100 vdc to measure 24 vdc
Disconnect wiring harness (10934482) from control box
Make sure power lead is connected to control box
Turn MASTER switch to ON
Connect black probe to vehicle for ground.
Place control box switches in positions indicated in following chart and check outlet connector pin listed for 24 vdc with red probe.

Table 23-3. Troubleshooting the Winterization Kit — Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CREW HEATER — Continued

Step 6. Continued

Start — Run Switch Position	HI — LO Switch Position	24 vdc Required at Outlet Connector Pins
START	HI	A, C, D
START	LO	A, C, D
RUN	HI	A, D
RUN	LO	A, D

a. If meter reads 24 v/dc on all connector pins, reconnect harness and go to step 7.

b. If meter reads zero on any one of the above pins, replace heater control box (para 23-31*f*). Reconnect wiring harness.

Step 7. *Check continuity of all circuits in wiring harness (10934482).*
Disconnect harness from control box, from heater and from fuel pump.
Zero multimeter.
At wiring harness control box connector, connect one multimeter probe to circuit 402R socket A and connect second probe to fuel pump bell connector. Check continuity. Check each wire in turn at sockets in connectors: circuit 401, C socket; circuit 402, B socket; circuit 410, E socket; and circuit 411, D socket. At heater socket connect multimeter leads to A socket and ground lead.

a. If meter reads 0 ohms at all circuits, repair heater (para 23-31g). Connect harness to control box, heater and fuel pump.

b. If meter does not move on any one circuit, repair or replace harness.

2. HEATER STARTS BUT IGNITION TIME IS EXCESSIVE.

Step 1. *If smoke shows at heater exhaust for more than 5 minutes, check electrolite in batteries for low battery charge.*
Charge or replace batteries (TM 9-2300-216-20).

Step 2. *Igniter may be fouled with carbon due to operation with heater switch in LOW position.*
Provide fully charged battery and start heater. Operate heater in HI position to clean igniter. Leave switch in HI position as heater will automatically reduce to low if heater is too hot.

Step 3. *Check heater leads for tight connections or corroded connections.*

a. Tighten loose connections.

b. Disconnect, clean and reconnect corroded connections.

Step 4. *Check heater ground lead connection of wiring harness (10934482) at heater mounting bracket for tightness and corrosion.*
Turn heater switch to OFF.

a. If connection is loose, tighten connection.

b. If connection shows rust or corrosion, remove washer and screw securing lead to mounting bracket. Remove all paint, rust and corrosion from bracket and terminal. Reinstall and secure ground lead, making sure there is a solid metal to metal contact. Reinstall heater.

Step 5. *Check fuel supply for low fuel and check for clogged fuel filter.*

a. Fill fuel tank.

b. Remove and clean fuel filter.

Step 6. *Check for faulty heater fuel pump.*
Turn heater switch to OFF.
Provide suitable container of 1 pint or more.
Disconnect pump-to-heater fuel hose at heater.
Turn heater switch to ON and measure amount of fuel pumped into container for 10 seconds. Dispose of fuel.

a. If flow is approximately ½ pint (1 cup), pump is working properly. Connect pump-to-heater fuel hose to heater.

b. If flow is less than ½ cup, replace fuel pump (para 23-31*f*). Connect pump-to-heater fuel hose to heater.

c. If heater will still not operate, repair heater (para 23-31*g*). Connect pump-to-heater fuel hose to heater.

3. HEATER FAILS TO KEEP BURNING.

Step 1. *Check fuel supply for low fuel.*
Fill fuel tank.

Step 2. *Check for clogged or dirty fuel filter.*
Clean fuel filter.

Step 3. *Check that red light for RUN is ON.*
If heater burns but red light for RUN does not light, flame switch is faulty. Replace heater (para 23-18).

4. BLOWER MOTOR DOES NOT OPERATE.

Step 1. *Remove heater cover by turning oval-head stud at top of control cover, and check for loose connection at terminal post 8.*

a. Tighten and connect if loose. Install heater cover.

b. If connection is tight, flame switch or blower motor is faulty. Replace heater (para 23-18).

5. BLOWER MOTOR WILL NOT SHUT OFF AFTER 5 MINUTES.

Step 1. *Check that air flow is cold.*
If air flow is cold and blower motor does not shut off, flame switch is faulty. Replace heater (para 23-18).

23-30. Winterization Kit Removal

Remove winterization kit in reverse order of installation. For removal procedures, refer to TM 9-2300-216-20.

23-31. Winterization Kit Repair

a. *Driver's Enclosure Window Repair* (fig. 23-24).

(1) *Disassembly.*

(*a*) Remove two self-locking nuts, lock washers and screws securing window catch and remove catch.

(*b*) Remove two machine screws and lock washers securing each of two locking plates to bottom of window frame and remove locking plates.

(*c*) Remove two self-locking nuts, four washers and two machine screws securing each of two strap loops, straps and chain assemblies to bottom of window and remove strap loop, strap and chain assembly.

(*d*) If damaged, remove rubber seal from bottom of window frame. Seal is applied with rubber adhesive.

(*e*) Remove rubber seal from left and right window glass and frame and remove window glass. Seal is applied with rubber adhesive.

(2) *Cleaning.*

CAUTION

Window glass is plastic and will be damaged with solvent or paint thinner.

(*a*) Clean all parts except window glass with dry cleaning solvent (SD-2).

(*b*) Remove rubber adhesive with solvent or alcohol and wire brush.

(*c*) Clean straps and window glass with soap and water.

(3) *Inspection.*

(*a*) Inspect all parts for damage and serviceability.

(*b*) Inspect threaded areas for damage and crossed threads.

(4) *Repair.*

(*a*) Repair damaged threaded areas with thread chaser or dull die.

(*b*) Replace defective or damaged parts.

(*c*) Repaint damaged painted areas.

(5) *Assembly.* Assemble driver's enclosure window in reverse order of disassembly. Apply rubber adhesive, specification MMM-A-1617 Type I to secure window glass to seal; Type II to secure glass seal to window frame; and Type III to secure bottom seal to window frame.

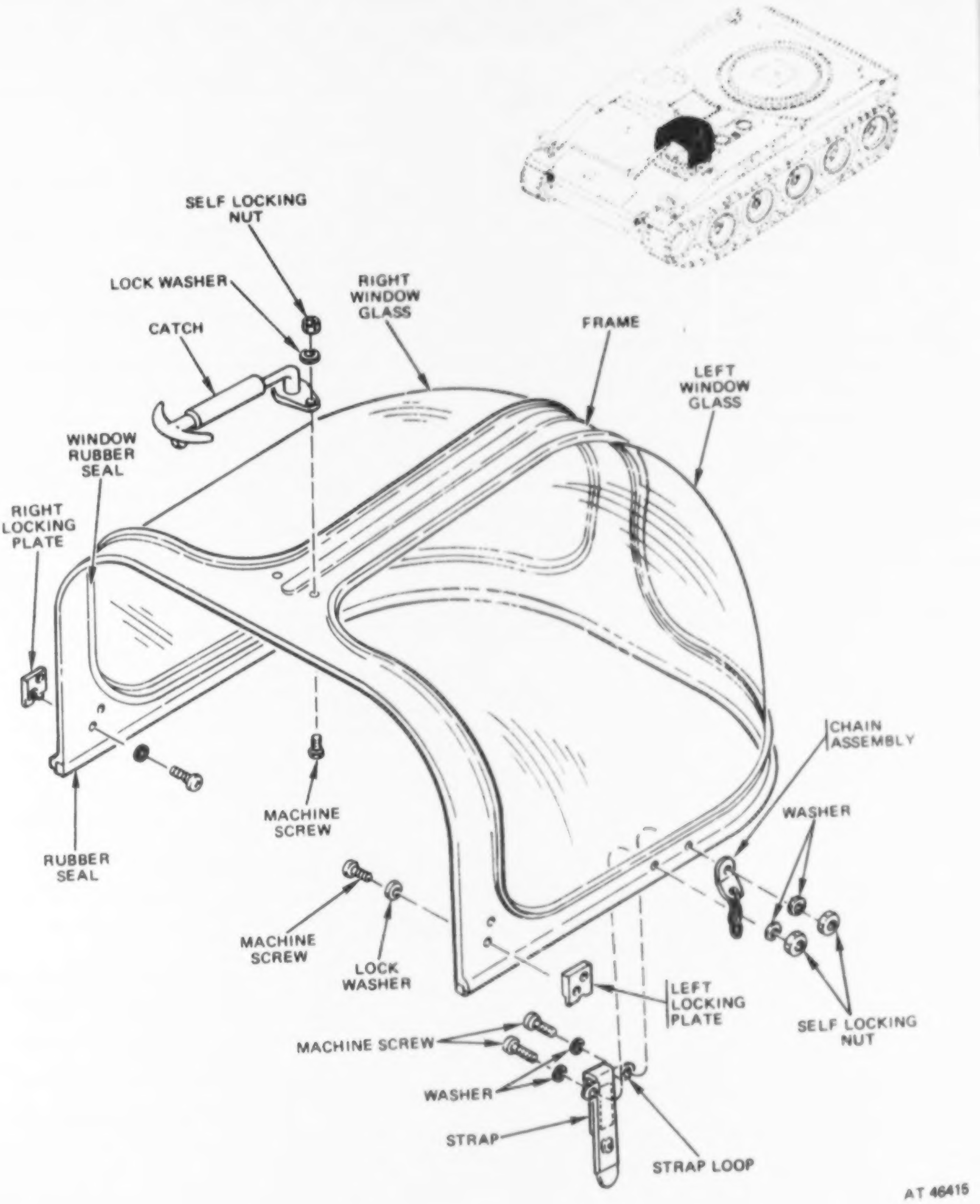

SELF LOCKING NUT
LOCK WASHER
CATCH
RIGHT WINDOW GLASS
FRAME
LEFT WINDOW GLASS
WINDOW RUBBER SEAL
RIGHT LOCKING PLATE
CHAIN ASSEMBLY
WASHER
MACHINE SCREW
RUBBER SEAL
MACHINE SCREW
LOCK WASHER
LEFT LOCKING PLATE
SELF LOCKING NUT
MACHINE SCREW
WASHER
STRAP
STRAP LOOP
AT 46415

Figure 23-24. Driver's enclosure window disassembly or assembly.

b. Driver's Enclosure Windshield Repair (fig. 23-25).

(1) *Disassembly.*

(*a*) Remove two machine screws, lock washers and self-locking nuts securing hood catch bracket to top of windshield and remove bracket.

(*b*) Remove two machine screws and lock washers securing each locking plate to inside of windshield and remove locking plates.

(*c*) Remove two machine screws, flat washers and self-locking nuts securing bracket to bottom of windshield frame and remove bracket.

(*d*) Remove windshield lower seal from rear of windshield frame. Seal is applied with rubber adhesive.

(*e*) Remove seal rubber lock from rubber seal and remove windshield glass and rubber from frame. Remove rubber seal from windshield glass. Seal is applied to glass and frame with rubber adhesive.

(2) *Cleaning.*

(*a*) Clean all parts with dry-cleaning solvent (SD-2).

(*b*) Remove rubber adhesive with solvent or alcohol and wire brush.

(3) *Inspection.*

(*a*) Inspect all parts for damage and serviceability.

(*b*) Inspect threaded areas for damage and crossed threads.

(4) *Repair.*

(*a*) Repair damaged threaded areas with thread chaser or dull die.

(*b*) Replace defective or damaged parts.

(*c*) Repaint damaged painted areas.

(5) *Assembly.* Assemble driver's enclosure windshield in reverse order of disassembly. Apply rubber adhesive, specification MMM-A-1617 Type II, to secure glass to seal and seal to frame.

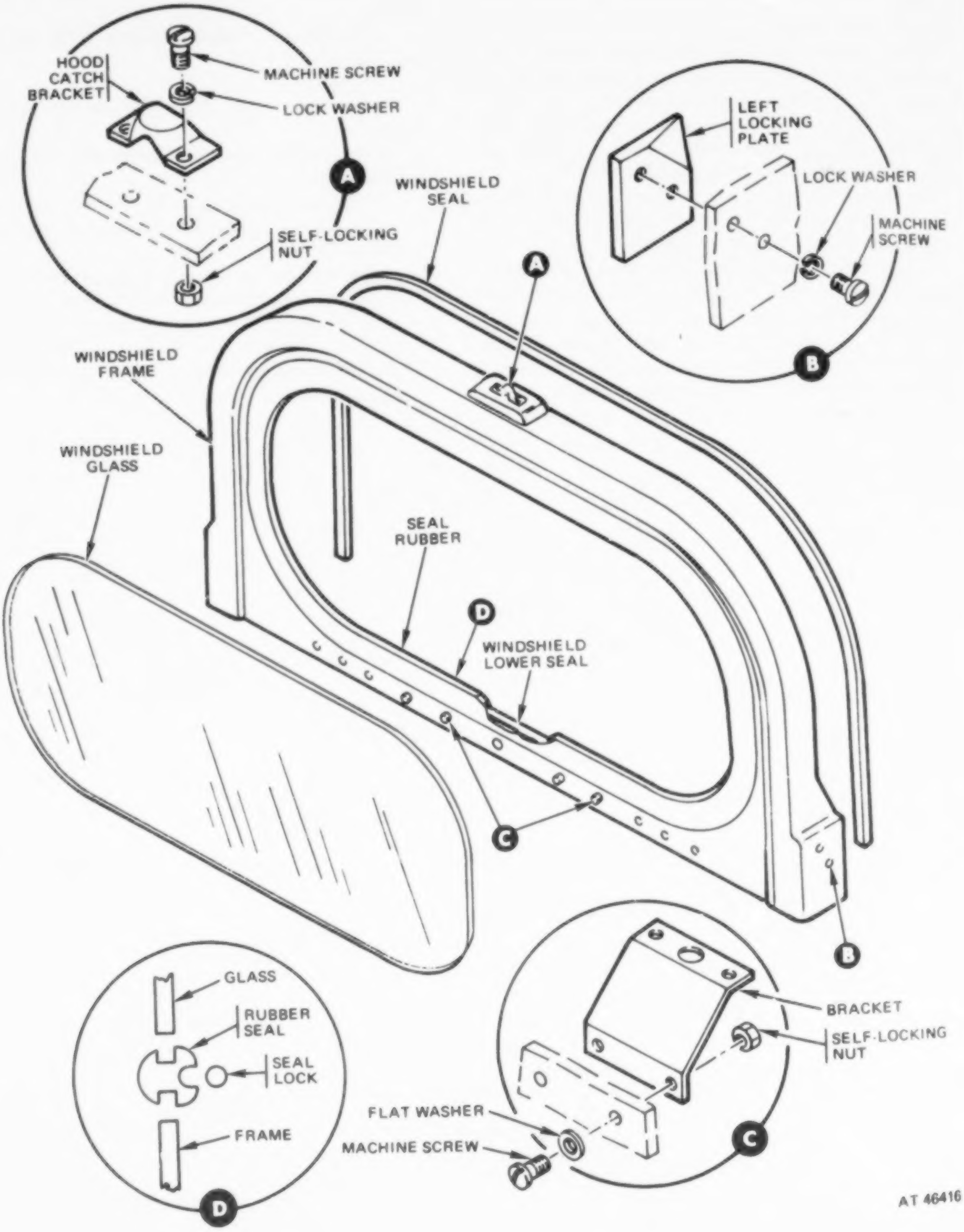

HOOD CATCH BRACKET
MACHINE SCREW
LOCK WASHER
A
SELF-LOCKING NUT
WINDSHIELD SEAL
A
LEFT LOCKING PLATE
LOCK WASHER
MACHINE SCREW
B
WINDSHIELD FRAME
WINDSHIELD GLASS
SEAL RUBBER
D
WINDSHIELD LOWER SEAL
C
B
GLASS
RUBBER SEAL
SEAL LOCK
FRAME
D
BRACKET
SELF-LOCKING NUT
FLAT WASHER
MACHINE SCREW
C
AT 46416

Figure 23-25. Driver's enclosure windshield disassembly or assembly.

c. *Driver's Enclosure Windshield Base Assembly Repair* (fig. 23-26).

(1) *Disassembly.*

(*a*) Remove two grommets from front center holes in base.

(*b*) Remove two corner seals from base seal. Remove base seal from base top edge. Remove forward base seal from front of base. Seals are applied with rubber adhesive.

(*c*) Remove two nylon pads from underside of front lip of base. Pads are supplied with epoxy cement.

(2) *Cleaning.*

(*a*) Clean all parts with dry-cleaning solvent (SD-2).

(*b*) Remove rubber adhesive with solvent or alcohol and wire brush.

(*c*) Scrape or grind off epoxy from pad mounting surfaces.

(3) *Inspection.* Inspect all parts for damage and deteriorated painted areas.

(4) *Repair.* Repair consists of replacing damaged components.

(5) *Assembly.* Assemble driver's enclosure base assembly in reverse order of disassembly. Apply rubber adhesive, specification MMM-A-1617 Type III to seals. Apply epoxy cement EC-B/8 (94960) to nylon pads. Curing time: 3-7 days at 70°F.

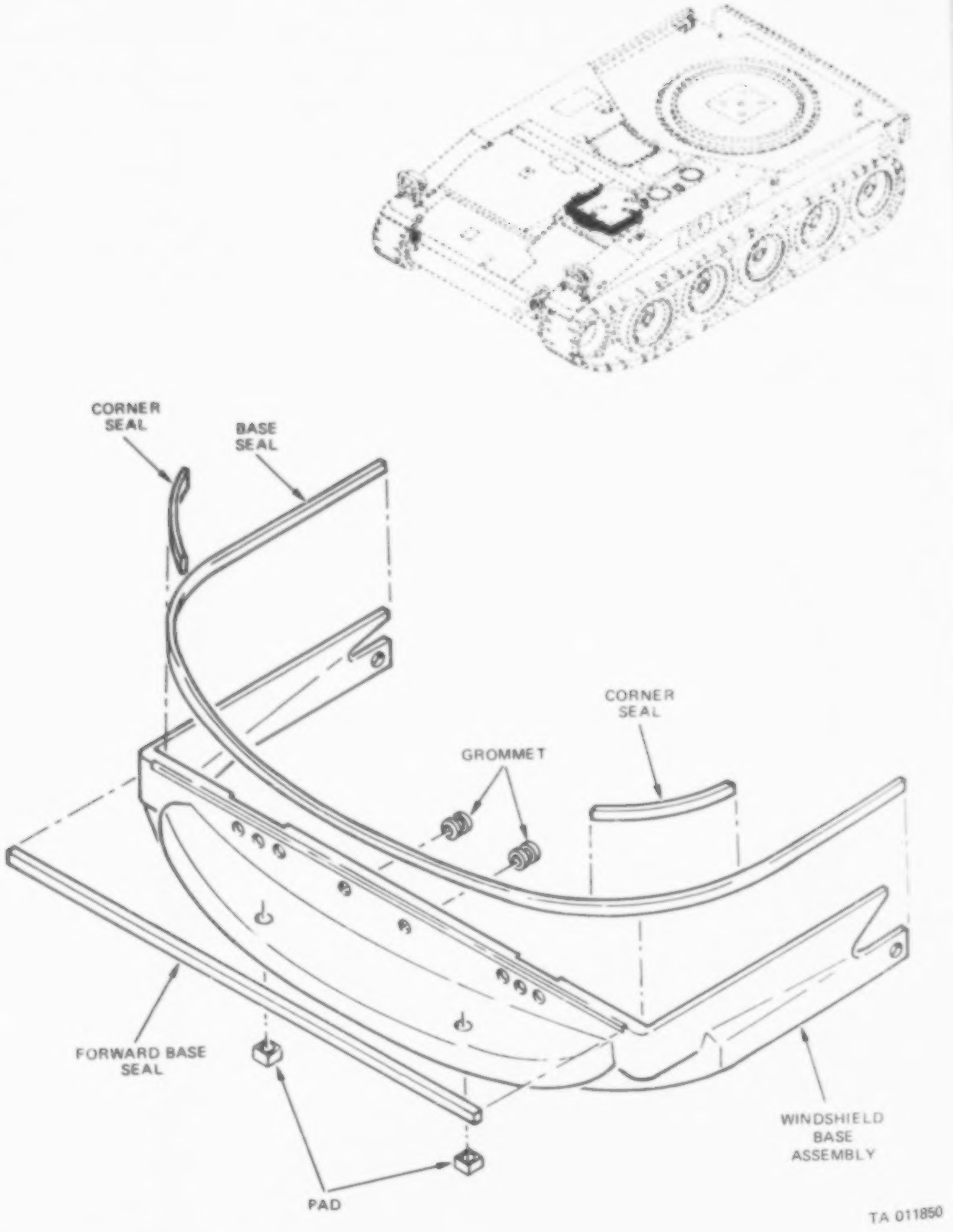

CORNER SEAL
BASE SEAL
CORNER SEAL
GROMMET
FORWARD BASE SEAL
WINDSHIELD BASE ASSEMBLY
PAD
TA 011850

Figure 23-26. Driver's enclosure base disassembly or assembly.

d. Coolant Heater Repair (fig. 23-27).

(1) ***Disassembly.***

(*a*) Loosen two hose clamps connecting coolant return hose to heater elbow and coolant pump. Remove hose and clamps and remove heater elbow from heater.

(*b*) Disconnect electrical connectors and wiring from coolant pump. Remove two coolant pump attaching nuts and remove coolant pump from mount.

(*c*) Disconnect fuel pump electrical connector from wiring harness. Disconnect fuel filter-to-regulator hose from hose adapter on fuel filter and remove hose adapter from filter. Remove two machine screws, lock washers and nuts securing fuel filter to bracket. Remove two cap screws, lock washers and nuts securing fuel pump to mount and remove fuel pump and filter. Remove fuel filter from pipe nipple in fuel pump and remove pipe nipple. Remove inlet fuel elbow from bottom of fuel pump. Remove two screws, lock washers and nuts securing filter bracket to mount and remove bracket.

(*d*) Remove drain cock from pipe coupling, pipe coupling from drain cock tube and drain cock tube from elbow in heater coolant output tee. Disconnect wiring harness connectors from coolant heater connector and control box assembly connector and remove wiring harness. Remove rubber grommet from mount.

(*e*) Open two heater clamps and remove coolant heater from mount. Disconnect and remove fuel filter to regulator hose from elbow in heater and remove elbow. Remove elbow, pipe bushing, output hose end, tee and nipple from heater.

(*f*) Remove two screws and lock washers securing heater clamp bracket to rear of mount and remove bracket and clamp. Remove two screws, lock washers and nuts securing forward heater clamp bracket and remove bracket and clamp. Remove clamps from brackets.

(*g*) Remove two nuts and lock washers securing control box assembly to mount and remove control box assembly.

(*h*) Remove four machine screws and self-locking nuts and remove cover hinge, hinge shim, cover, two spring retainers and cover spring from mount. If damaged, remove instruction plate from cover. Instruction plate is attached to cover with epoxy adhesive.

(*i*) Remove two self-locking nuts from each service repair handle and remove both handles from mount.

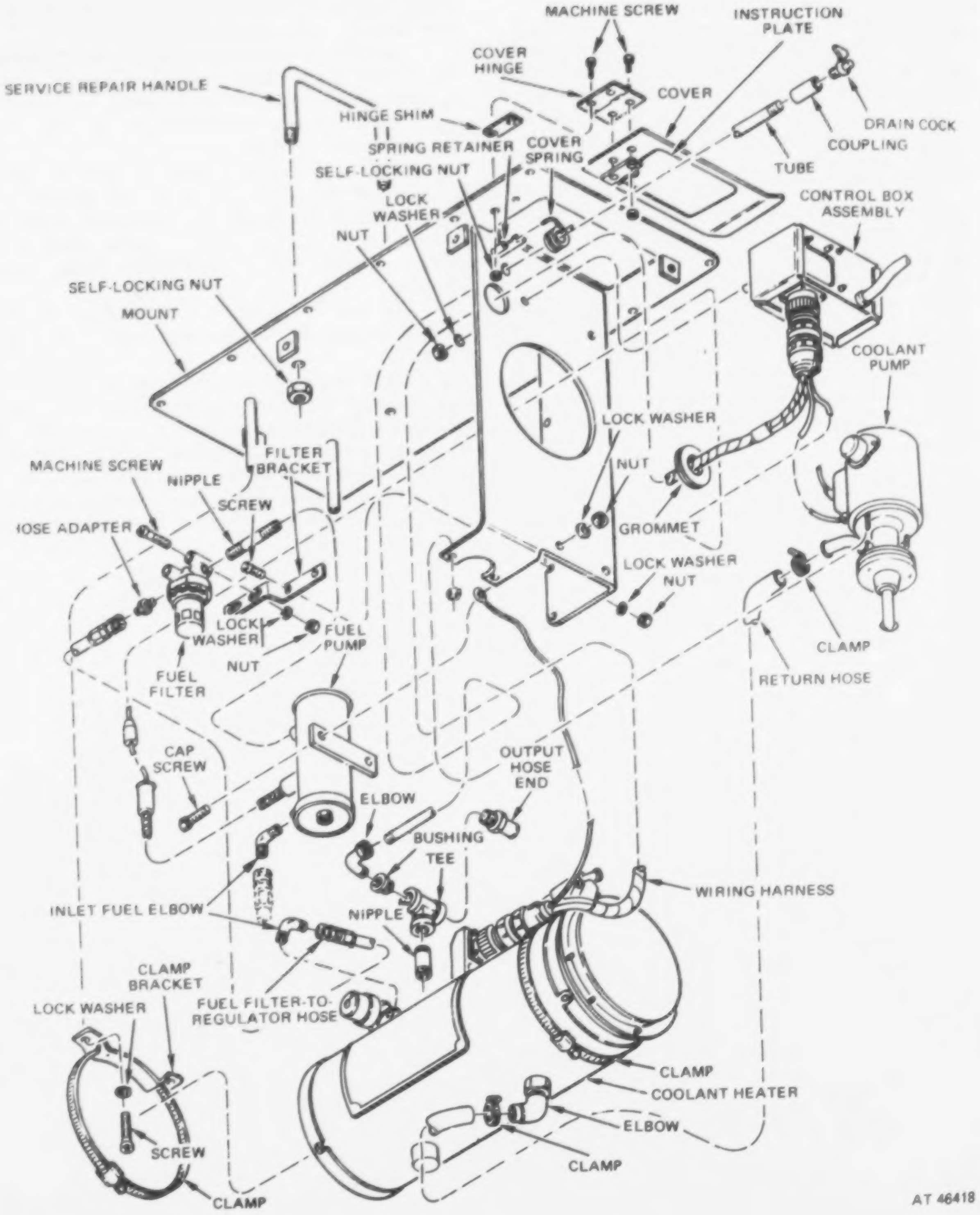

MACHINE SCREW
INSTRUCTION PLATE
COVER HINGE
SERVICE REPAIR HANDLE
COVER
HINGE SHIM
DRAIN COCK
SPRING RETAINER
COVER SPRING
COUPLING
SELF-LOCKING NUT
TUBE
LOCK WASHER
CONTROL BOX ASSEMBLY
NUT
SELF-LOCKING NUT
MOUNT
COOLANT PUMP
LOCK WASHER
FILTER BRACKET
MACHINE SCREW
NUT
NIPPLE
SCREW
HOSE ADAPTER
GROMMET
LOCK WASHER
NUT
LOCK WASHER
FUEL PUMP
NUT
CLAMP
FUEL FILTER
RETURN HOSE
CAP SCREW
OUTPUT HOSE END
ELBOW
BUSHING
TEE
WIRING HARNESS
INLET FUEL ELBOW
NIPPLE
CLAMP BRACKET
LOCK WASHER
FUEL FILTER-TO-REGULATOR HOSE
CLAMP
COOLANT HEATER
ELBOW
SCREW
CLAMP
CLAMP
AT 46418

Figure 23-27. Coolant heater assembly, disassembly or assembly.

(2) *Cleaning.*

(*a*) Clean all metal parts with dry-cleaning solvent (SD-2).

(*b*) Clean electrical harnesses and hoses with soap and water.

(3) *Inspection.*

(*a*) Inspect all parts for damage and serviceability.

(*b*) Inspect threaded areas for damage and crossed threads.

(*c*) Inspect wiring harness and leads for frayed condition and broken wires.

(*d*) Inspect hoses for frayed condition, breaks, deteriorated rubber and internal collapse.

(4) *Repair.* Repair consists of replacing damaged components with serviceable parts. Repaint damaged painted areas.

(5) *Assembly.* Assemble coolant heater in reverse order of disassembly.

e. Crew Shelter Repair.

(1) *Disassembly.* The crew shelter should only be disassembled to the extent necessary for repair. The procedures for disassembly are the reverse of the assembly procedures given in paragraph 23-13.

(2) *Cleaning.*

(*a*) Clean all metal parts with dry-cleaning solvent (SD-2).

(*b*) Clean cover, straps and windows with mild soap and water.

(*c*) Remove rust or corrosion from metal parts with dry-cleaning solvent and crocus cloth.

(3) *Inspection.*

(*a*) Inspect cover and shroud for ripped or torn areas.

(*b*) Check framework for bent or broken components.

(*c*) Check for loose attaching hardware.

(4) *Repair.*

(*a*) Replace damaged or defective parts.

(*b*) Repaint damaged painted areas.

(*c*) Tighten all loose attaching hardware.

(5) *Assembly.* Reassemble the crew shelter. Refer to assembly procedures in paragraph 23-13.

f. Crew Heater Assembly Repair (fig. 23-28).

(1) *Disassembly.*

(*a*) Close fuel shut-off cock. Remove tank-to-pump fuel tube from shut-off cock adapter and fuel pump adapter. Provide suitable container of five-gallon capacity and drain fuel tank.

(*b*) Disconnect control box wiring harness from heater, control box and fuel pump connector. Remove nut, lock washer, screw and clamp securing wiring harness to top of fuel tank and remove harness.

(*c*) Disconnect pump-to-filter tube from fuel pump elbow and fuel filter elbow and remove tube.

(*d*) Open two loop clamps securing heater-to-heater mount and remove heater. Remove loop clamps from heater mount.

(*e*) Remove elbow, fuel filter and nipple from cab heater.

(*f*) Remove two nuts, lock washers and screws securing fuel pump to heater mount. Remove elbow from top of pump and adapter from bottom of pump.

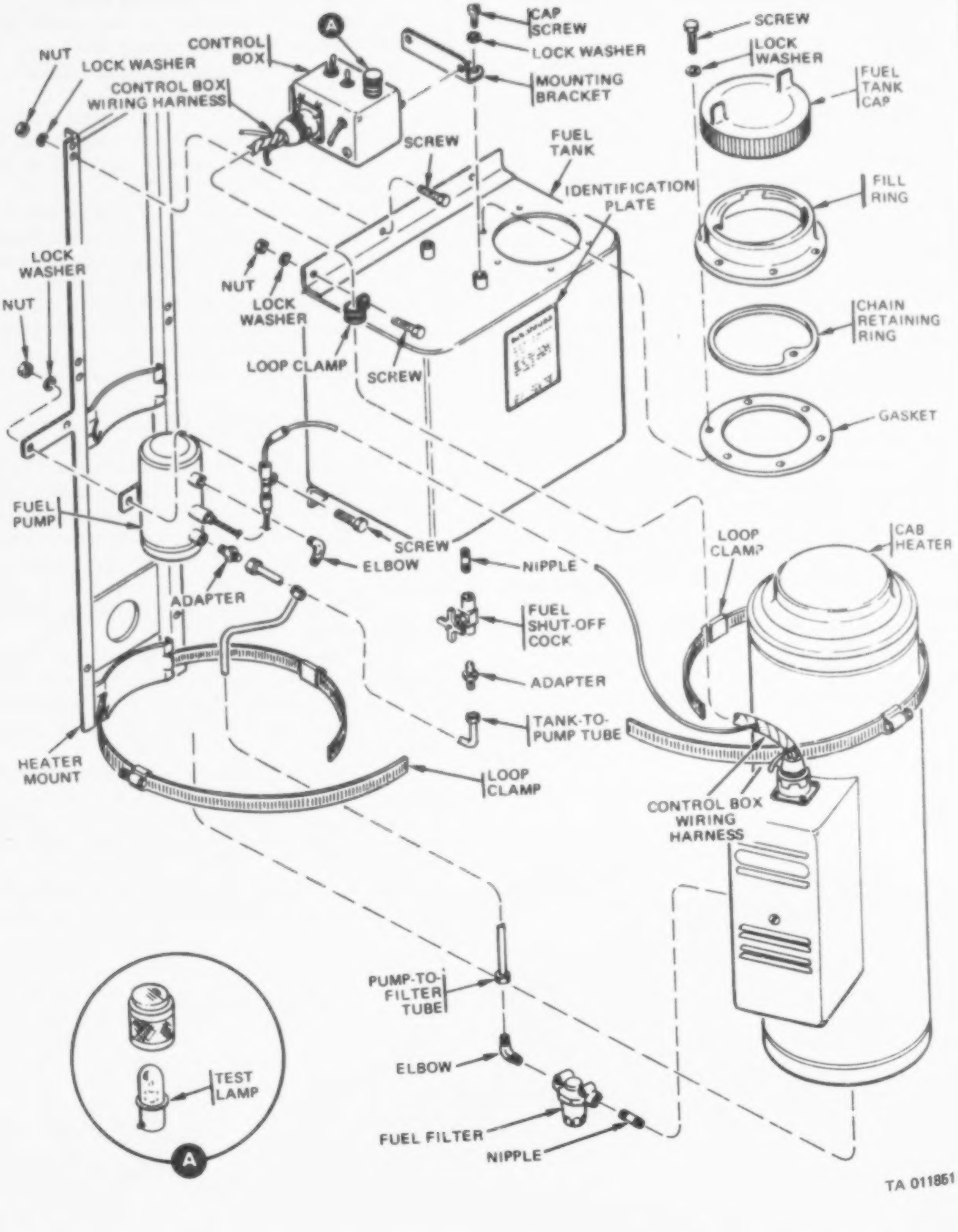
(*g*) Remove four nuts, lock washers and screws securing fuel tank to heater mount and remove fuel tank.

(*h*) Remove adapter, fuel shut-off cock and nipple from bottom of fuel tank.

(*i*) Remove two cap screws and lock washers securing control box mounting bracket to top of fuel tank and remove control box and bracket. Remove two screws securing mounting bracket to control box and remove bracket.

(*j*) Remove fuel tank cap and disconnect retaining chain from retaining ring. Remove six screws and lock washers securing fill ring to top of fuel tank and remove fill ring, chain retaining ring and gasket. Discard gasket.

(*k*) If damaged, remove instruction plate from side of fuel tank. Plate is attached with epoxy resin.


A
CONTROL BOX
CAP SCREW
LOCK WASHER
MOUNTING BRACKET
SCREW
LOCK WASHER
FUEL TANK CAP
NUT
LOCK WASHER
CONTROL BOX WIRING HARNESS
SCREW
FUEL TANK
IDENTIFICATION PLATE
FILL RING
LOCK WASHER
NUT
NUT
LOCK WASHER
CHAIN RETAINING RING
LOOP CLAMP
SCREW
GASKET
FUEL PUMP
SCREW
ELBOW
NIPPLE
LOOP CLAMP
CAB HEATER
ADAPTER
FUEL SHUT-OFF COCK
ADAPTER
TANK-TO-PUMP TUBE
HEATER MOUNT
LOOP CLAMP
CONTROL BOX WIRING HARNESS
PUMP-TO-FILTER TUBE
TEST LAMP
ELBOW
FUEL FILTER
NIPPLE
A

TA 011861

Figure 23-28. Crew heater assembly, disassembly or assembly.

(2) *Cleaning.*

(*a*) Clean all metal parts with dry-cleaning sol-ent (SD-2).

(*b*) Remove rust or corrosion with dry-cleaning olvent and crocus cloth.

(*c*) Clean wiring harness with soap and water.

(*d*) Dry all parts with clean, dry, low pressure ompressed air.

(3) *Inspection.*

(*a*) Inspect fuel tank and tubes for cracks, leaks, amage or warped condition.

(*b*) Inspect wiring harness for frayed insulation nd broken wires.

(*c*) Inspect all threaded areas for clean un-amaged condition and for evidence of damaged hreads.

(*d*) Inspect heater mount for cracks and warp-ng.

(4) *Repair.*

(*a*) Repair heater in accordance with paragraph *g* below.

(*b*) Weld and straighten repairable fuel tank nd heater mount.

(*c*) Use thread chaser on damaged threads.

(*d*) Replace defective non-repairable parts.

(5) *Assembly.* Assemble cab hot air heater assem-bly in reverse order of disassembly. Secure new instruc-tion plate to fuel tank with epoxy resin specification MIL-A-8623.

(6) *Test.* If a new heater is installed, the fuel flow must be checked and adjusted for proper operation as the heaters are adjusted for horizontal operation at time of manufacture. Refer to paragraph *g* (6) below for heater test. Refer to paragraph *h*(2) below for alter-nate heater test.

g. Crew Heater Repair (fig. 23-29).

(1) *Disassembly.*

(*a*) Remove cover by turning oval-head stud, at top of control cover assembly, until cover is released.

NOTE

Make certain that all lead wires are tagged or otherwise identified so as to facilitate reassembly.

(*b*) Remove wire assemblies from terminal posts on flame switch assembly.

(*c*) Loosen nut on flame switch tube until it is free from combustion chamber tube. Remove flame switch.

(*d*) Remove plug button from side of top casing. Pry grommet out of plug button if necessary.

(*e*) Disconnect igniter wire assembly from igniter assembly.

(*f*) Remove two hose clamps and twist fuel hose off of fuel tube assembly and burner assembly.

(*g*) Remove four screws and intake cover assembly from top and bottom casing assembly.

(*h*) Remove four screws and exhaust adapter assembly from top and bottom casing assemblies.

(*i*) Remove eight screws and separate the bottom casing assembly from internal components and top casing assembly.

NOTE

To simplify reinstallation, attach "fish" wires to all wires routed between the control box and all components inside the casing.

(*j*) Remove top casing assembly and grommet from internal components.

(*k*) Remove four screws and separate blower assembly from combustion chamber.

(*l*) Remove nut, bracket and burner thermostat assembly from burner plate assembly.

(*m*) Carefully remove preheater plate from the burner plate assembly.

(*n*) Remove fuel tube grommet from burner plate assembly and grommet from notch in combustion chamber assembly.

(*o*) Remove the burner plate assembly.

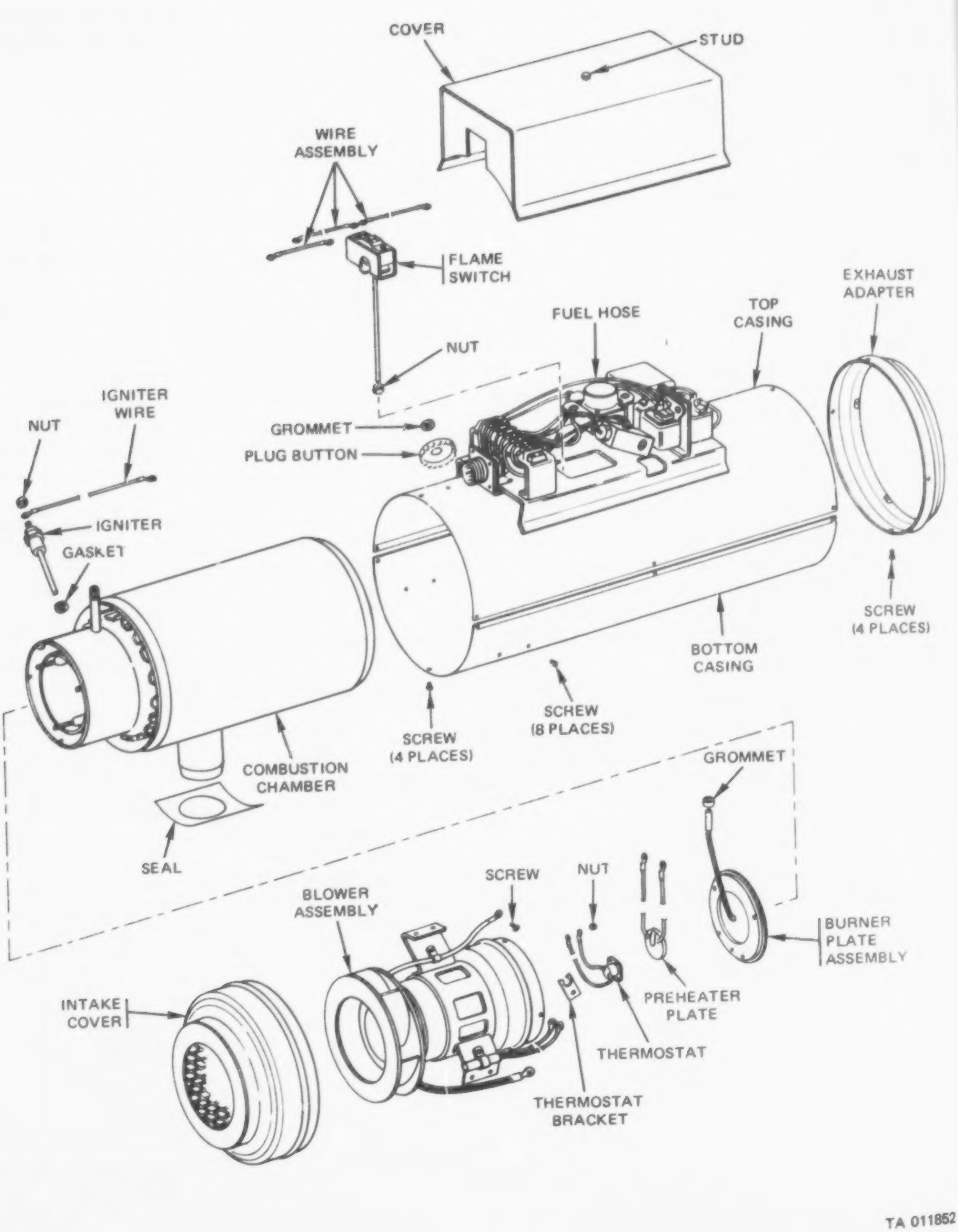

COVER
STUD
WIRE ASSEMBLY
FLAME SWITCH
NUT
FUEL HOSE
TOP CASING
EXHAUST ADAPTER
IGNITER WIRE
NUT
GROMMET
PLUG BUTTON
IGNITER
GASKET
SCREW (4 PLACES)
BOTTOM CASING
SCREW (8 PLACES)
SCREW (4 PLACES)
COMBUSTION CHAMBER
GROMMET
SEAL
SCREW
NUT
BLOWER ASSEMBLY
BURNER PLATE ASSEMBLY
INTAKE COVER
PREHEATER PLATE
THERMOSTAT
THERMOSTAT BRACKET
TA 011852

Figure 23-29. Crew heater disassembly or assembly.

(2) *Cleaning.*

(*a*) Clean all metal parts with dry-cleaning solvent (SD-2).

(*b*) Remove rust or corrosion with dry-cleaning solvent and crocus cloth.

(*c*) Clean wire leads with soap and water.

(*d*) Dry all parts with clean, dry, low pressure compressed air.

(*e*) Use a scraper (NSN 5110-00-735-5872) to remove carbon from the igniter assembly, combustion assembly and burner plate. Make certain that all air holes, ports and passages are free of carbon accumulations.

(3) *Inspection.*

(*a*) Inspect all parts for damaged, bent, warped or burned condition.

(*b*) Inspect wire leads for frayed insulation, broken wire or corrosion.

(*c*) Inspect all threaded areas for damaged or crossed threads.

(*d*) Inspect flame switch assembly. Make sure tube is not bent or distorted and quartz rod is not nicked or cracked.

(*e*) Inspect burner plate assembly for breaks, dents or burnthrough. Make sure there are no signs of leakage around housing and fuel tube.

(4) *Repair.*

(*a*) Straighten bent or deformed metal parts.

(*b*) Replace unserviceable burner plate assembly, preheater plate, thermostat bracket, thermostat bracket attaching nut and blower assembly attaching screws as required. Use parts kit 5703782.

(*c*) Repaint damaged painted areas.

(5) *Assembly.* Assemble crew heater in reverse order of disassembly.

(6) *Test and adjustment.* After repair or initial installation of heater, conduct a bench test to verify that heater will operate properly. Refer to figure 23-30 for suggested test stand arrangement and proceed as follows:

(*a*) Mount heater in vertical position.

(*b*) Make provisions to dispose of exhaust gases during test. Connect external fuel and electric lines to heater.

(*c*) With ambient temperature at approximately 70°F., adjust input voltage to approximately 24 volts DC. Current should be 15.0 amperes during preheat (2.5 to 3 minutes), and 9.5 amperes full-run current during run cycle (3 to 3.5 minutes, including preheat time).

(*d*) With heater in full-run, fuel flow should be 44 to 45 cc per minute on HI-FIRE and 22 to 23 cc per minute on LO-FIRE. If adjustment is required, turn adjusting screw on flow regulator valve in to increase fuel flow or out to reduce fuel flow. Recheck flow after adjusting.

(*e*) Remove cover from heater and check voltage at terminal D of flame detector switch. This should be zero volts. Check igniter voltage and input voltage on terminal no. 3 of terminal strip. If input voltage exceeds 25.5 volts, igniter voltage should be 3 volts lower than voltage at terminal no. 3.

(*f*) Check for any signs of fuel leakage.

(*g*) Block off all flow of ventilating air by covering blower inlet with a stiff or non-pliable item. At 475°F or more, limit overheat switch should shut off incoming fuel supply; if heater does not shut off or shuts off too soon, replace limit overheat switch.

(*h*) With heater set on HI-FIRE, turn heater control switch ot OFF. Fuel flow should drop to zero immediately, and heater purge time should take 1.5 to 2 minutes.

(*i*) With heater off and 15 psig maximum fuel pressure at inlet side, there should be no leakage during a 5-minute period.

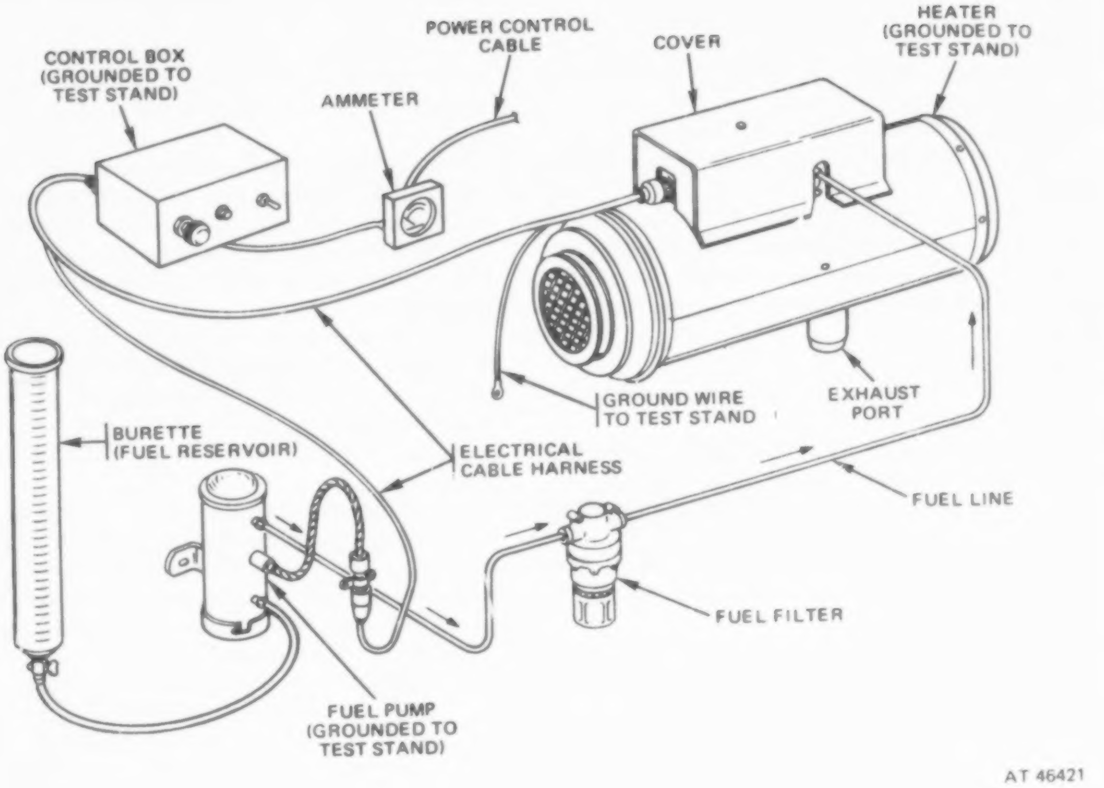

POWER CONTROL CABLE
COVER
HEATER (GROUNDED TO TEST STAND)
CONTROL BOX (GROUNDED TO TEST STAND)
AMMETER
GROUND WIRE TO TEST STAND
EXHAUST PORT
BURETTE (FUEL RESERVOIR)
ELECTRICAL CABLE HARNESS
FUEL LINE
FUEL FILTER
FUEL PUMP (GROUNDED TO TEST STAND)
AT 46421

Figure 23-30. Crew heater test stand arrangement.

h. Crew Heater (Alternate, 7748716) Repair.

(1) *General.* Repair of the alternate crew heater, part number 7748716, is not authorized. Clean exterior and inspect heater for serviceability and/or damage. If heater is damaged, unserviceable of in need of repair, replace with new crew heater. If newly installed heater is a Perfection type, part number 11601809, refer to paragraph *g* (6) above for test and adjustment procedures. If newly installed heater is the alternate South Wind type, part number 7748716, proceed with test procedures in paragraph (2) below.

(2) *Test.*

(*a*) Upon installation of a new heater, test heater to verify that heater will operate properly. A new heater is adjusted at time of manufacture for horizontal operation and fuel flow must be adjusted for vertical installation. Refer to figure 23-31 for suggested test stand arrangement.

(*b*) Mount heater in a vertical position.

(*c*) Make provision to dispose of exhaust gases during test. Connect external fuel and electric lines to heater as shown in figure 23-31.

(*d*) Turn on switch and permit fuel to flow into waste container until flow is stabilized. Place graduate under outlet tube and time flow for 1 minute. Snap off switch at end of timing interval.

(*e*) Measure fuel in graduate. High heat fuel flow should be 39 ± 2 cc per minute. If adjustment is required, turn adjusting screw on flow regulator valve in to increase fuel flow or out to reduce fuel flow. Recheck fuel flow after adjusting.

(*f*) Disconnect lead to restriction solenoid in control valve and repeat test in (d) above and measure low heat fuel flow. Low heat fuel flow should be 20 ± 2 cc per minute. If low heat flow is not within limits, replace heater and retest.

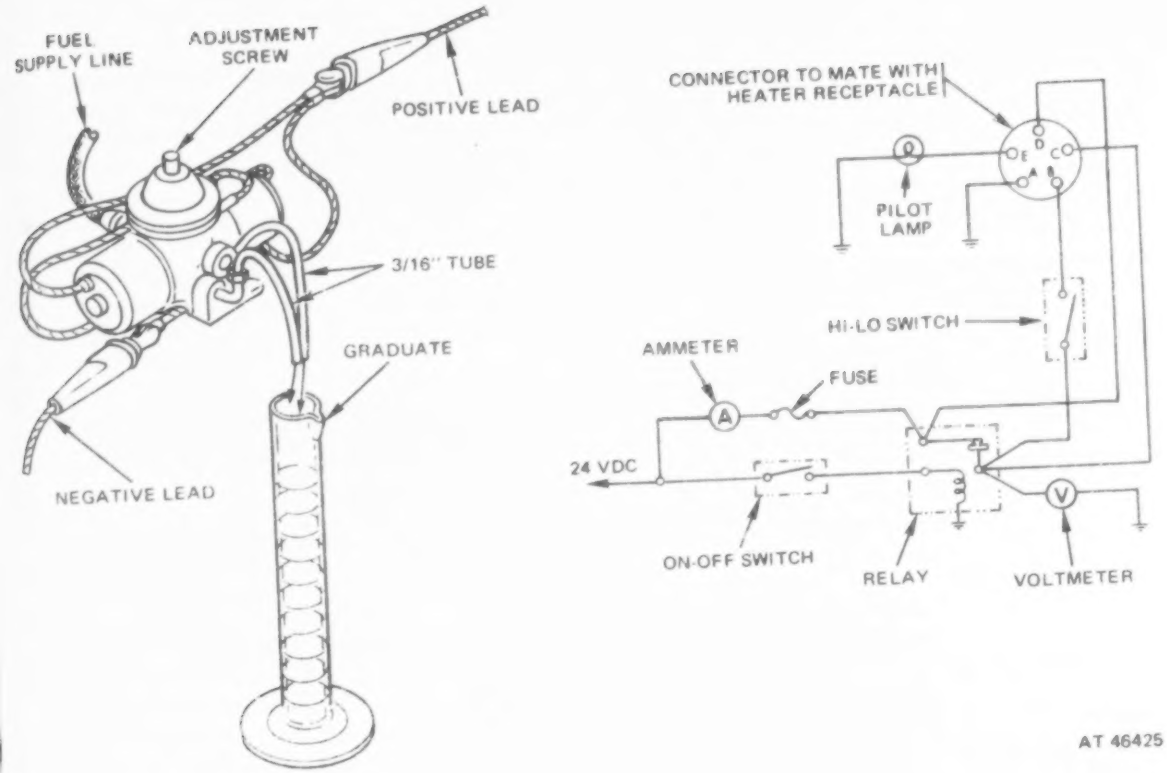

FUEL SUPPLY LINE
ADJUSTMENT SCREW
POSITIVE LEAD
3/16" TUBE
GRADUATE
NEGATIVE LEAD
CONNECTOR TO MATE WITH HEATER RECEPTACLE
E
D
C
A
B
PILOT LAMP
HI-LO SWITCH
AMMETER
A
FUSE
24 VDC
ON-OFF SWITCH
RELAY
V
VOLTMETER
AT 46425

Figure 23-31. Alternate crew heater (7748716) test stand arrangement.

Section VIII. ARCTIC TRACTION KIT

23-32. General

The arctic traction kit is utilized when ice and snow conditions require greater traction for positive steering.

23-33. Installation

(Fig. 23-32)

a. Shop Method.

(1) Remove track from one side of vehicle. Refer to TM 9-2300-216-10 for removal procedures.

(2) Remove and save nuts from each pad assembly.

(3) Tilt track 45 degrees or more and remove and save pad assemblies.

(4) Install arctic pad assemblies (11661686) using nuts (10911106) from kit. Torque nuts to 160-200 lb ft.

(5) Repeat steps (1) through (5) for other track.

(6) Store old pads and nuts for subsequent reinstallation.

b. Field Method.

(1) Remove all accessible pad assemblies while tracks are on vehicle.

(2) Install arctic pad assemblies using nuts (10911106) from kit. Torque nuts to 160-200 lb/ft.

(3) Move vehicle to provide access to additional pad assemblies. Repeat steps (1) and (2).

(4) Repeat step (3) until all pad assemblies have been replaced with arctic traction pad assemblies.

(5) Store old pad assemblies and nuts for subsequent reinstallation.

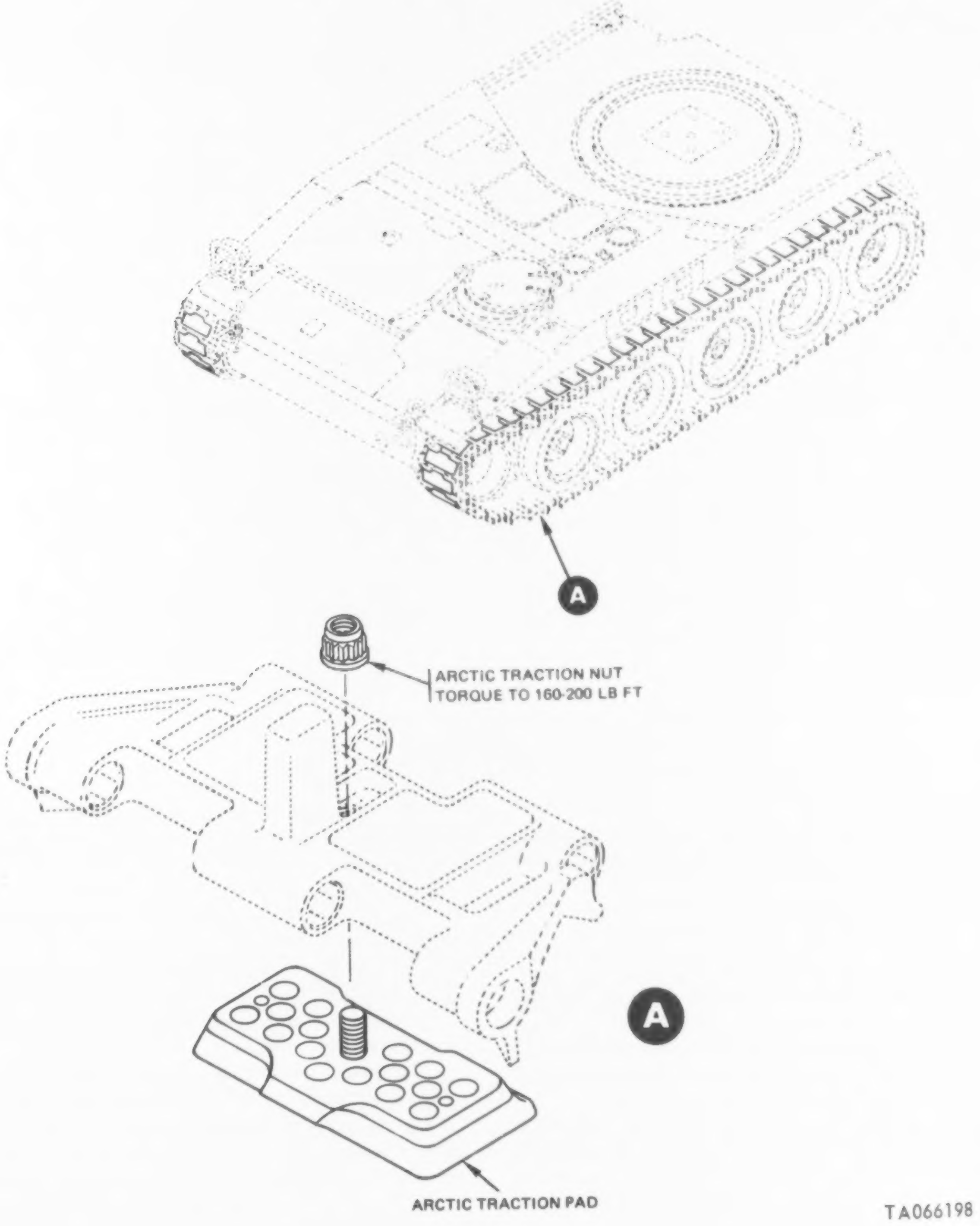

A
ARCTIC TRACTION NUT
TORQUE TO 160-200 LB FT
A
ARCTIC TRACTION PAD
TA066198

Figure 23-32. Arctic traction kit installation or removal.

23-34. Arctic Traction Kit Removal

Remove arctic traction kit in reverse order of installation. Reinstall regular pad that were removed when the arctic traction kit was installed.

APPENDIX A
REFERENCES

1. Publication Indexes

e following indexes should be consulted frequently r latest changes or revisions of references given in is appendix and for new publications relating to ateriel covered in this technical manual.

uthorized abbreviations and brevity codes	AR 310-50
ictionary of United States Army terms (short title: AD)	AR 310-25
ilitary publications (DA 10 series):	
Index of administrative publications (regulations, circulars, pamphlets, posters, Joint Chiefs of Staff publications, DOD and miscellaneous publications	DA Pam 310-1
Index of blank forms	DA Pam 310-2
Index of doctrinal, training and organizational publications	DA Pam 310-3
Index of technical manuals, technical bulletins, supply manuals (types 7, 8 and 9), supply bulletins, and lubrication orders	DA Pam 310-4
Index of supply catalogs and supply manuals (excluding types 7, 8 and 9)	DA Pam 310-6
US Army equipment index of modification work orders	DA Pam 310-7
Military symbols	FM 21-30

A-2. Specifications, Military and Federal

Adhesive-sealants, silicone, RTV, general purpose	MIL-S-46106
Antiseize compound, high temperature	MIL-A-907
Cleaning compound with conditioner and inhibitor for engine cooling systems	MIL-C-10597
Cables, special purpose, low tension, heavy duty, single-conductor and multiconductor	MIL-C-13486
Colors	FED-STD 595
Enamel, alkyd, gloss	TT-E-489
Enamel, alkyd, semi-gloss	TT-E-529
Extinguisher, fire, carbon dioxide, portable, permanent shutoff, hand and wheeled types	MIL-E-468
General purpose adhesive, rubber base	MMM-A-1617
General specifications for soldering process	MIL-S-6872
Hydraulic fluid, petroleum base, for preservation and testing	MIL-H-6083
Identification marking of U.S. military property	MIL-STD-130
Insulation tape electrical, pressure sensitive adhesive and pressure sensitive thermosetting	MIL-I-15126
Metal to metal structural bonding adhesive, epoxy resin	MMM-A-134
Painting procedures, tactical vehicles (tracked and wheeled)	MIL-STD-193
Primer coating, zinc chromate, low-moisture-sensitivity	MIL-P-8585
Primer-surfacer, synthetic, tints and white	TT-P-659
Sealing compound, electrical, silicone rubber, accelerator required	MIL-S-23586
Sealing compound, gasket, hydrocarbon fluid and water resistant	MIL-S-45180
Sealing compound, polysulfide rubber, electric connectors and electric systems, chemically cured	MIL-S-8516
Sealing, locking and retaining compounds	MIL-S-22473
Solder; tin alloy; lead-tin alloy; and lead alloy	QQ-S-571
Standard general requirements for electronic equipment	MIL-STD-454
Terminal lug; splice conductor (electrical, solderless for automotive use)	MIL-T-13513
Twine: impregnated, lacing and tying	MIL-T-713

A-3. Publications References

The following is a list of publications referenced in this manual or relating to this materiel:

Army safety program	AR 385-10
Accident reporting and records	AR 385-40
General repair of tents, canvas, and webbing	FM 10-16
Metal body repair and related operations	FM 43-2
Color, marking, and camoflage painting of military vehicles, construction equipment, and materials handling equipment	TB 43-0209
Use of antifreeze solutions and cleaning compounds in engine cooling systems	TB 750-651
Marking for shipment	MIL-STD-129
Storage and shipment of M107 and M110	MIL-G-46723
Chemical, biological, and radiological (CBR) decontamination	TM 3-220
Operation and maintenance of ordnance materiel in cold weather (0° to -65° F.)	TM 9-207
Inspection, care, and maintenance of antifriction bearings	TM 9-214
Welding: Theory and application	TM 9-237
Direct support, general support, and depot maintenance manual: Telescope, elbow M16A1D, M16A1F, M16A1G, M116, and M116C	TM 9-1240-288-35
Field and depot maintenance manual: Telescope mount M138	TM 9-1240-295-35
Operator's, organizational, direct support and general support maintenance manual for Quadrant, fire control (gunner's) M1A1 w/e (NSN 1290-00-891-9999) and M1A2 (radioactive) w/e (NSN 1290-00-169-1937) (including organizational, direct support, general support and depot maintenance repair parts and special tools for quadrant, fire control (gunner's) M1A1 only)	TM 9-1290-200-14&P
Direct support, general support, and depot maintenance manual: Quadrant, fire control, elevation: M15 (T23E2) (1290-896-2236)	TM 9-1290-322-35
Direct support and general support maintenance manual including repair parts and special tools list for: Fuze setter set M63 (NSN 1290-00-966-9318)	TM 1290-329-34
Direct support and general support maintenance repair parts and special tools list (including depot maintenance repair parts and special tools list) for Post, aiming: M1A2 (NSN 1290-00-535-7617)	TM 9-1290-347-34P
Ordnance maintenance: Fuze setters M14, M22, M23, M25 and M27	TM 9-1590
Ordnance maintenance: Periscopes M12, M13, M13B1, M14, M14A1, M17 and T22	TM 9-1608E
Equipment serviceability criteria for gun, field artillery, self-propelled: 175mm, M107 (2350-00-439-6635) and howitzer, heavy, self-propelled: 8-inch, M110 (2350-00-439-6243)	TM 9-2300-216-ESC
Operator's manual for gun, self-propelled, 175mm, M107 (2350-00-436-6635) and howitzer, heavy, self-propelled, 8-inch, M110 (2350-00-439-6243)	TM 9-2300-216-10
Organizational maintenance manual for gun, field artillery, self-propelled: 175mm, M107 (2350-436-6635) and howitzer, heavy, self-propelled: 175mm, M107 (2350-439-6243)	TM 9-2300-216-20
Organizational maintenance repair parts and special tools list for gun, field artillery, self-propelled: 175mm, M107 (2350-436-6635) and Howitzer, heavy, self-propelled: 8-inch M110 (2350-439-6243)	TM 9-2300-216-20P

Direct support and general support maintenance manual: Traversing and elevating systems, turret, and related components, used on gun, field artillery, self-propelled: 175mm, M107 (2350-436-6635) and howitzer, heavy, self-propelled: 8-inch, M110 (2350-439-6243)	TM 9-2300-216-34-2
Direct support and general support maintenance manual for 175mm gun cannon M113 and M113A1, 8-inch howitzer cannon M2A2, equilibrator and adjusting components, mount M158, and loader and rammer assembly used on: gun, field artillery, self-propelled, 175mm, M107 (2350-436-6635) and howitzer, heavy, self-propelled: 8-inch, M110 (2350-438-6243)	TM 9-2300-216-34/3
Direct support and general support maintenance repair parts and special tools lists (including depot maintenance repair parts and special tools) for gun, field artillery, self-propelled, 175mm, M107 (2350-00-436-6635) and howitzer, heavy, self-propelled: 8-inch, M110 (2350-00-439-6243), Hull and related components	TM 9-2300-216-34P-1
Direct support and general support maintenance repair parts and special tools list (including depot maintenance repair parts and special tools): Traversing and elevating systems, turret, and related components used on gun, field artillery, self-propelled: 175mm, M107 (2350-436-6635) and howitzer, heavy, self-propelled: 8-inch, M110 (2350-439-6243)	TM 9-2300-216-34P-2
Direct support and general support maintenance repair parts and special tools list (including depot maintenance repair parts and special tools) for 175mm gun, cannon M113A1, 8-inch howitzer cannon M2A2, mount M158, equilibrator and adjusting components, and loader and rammer assembly used on: gun, field artillery, self-propelled: 175mm, M107 (2350-436-6635) and howitzer, heavy, self-propelled: 8-inch M110 (2350-439-6243)	TM 9-2300-216-34P-3
Field and depot maintenance manual for power train assembly (8351100) (Allison model XTG-411-2A) composed of: transfer assembly, transmission input (2520-00-894-9535); transmission assembly (2540-00-894-9535); drive assembly, transmission output, vehicle left (2520-00-894-9534); drive assembly, transmission output, vehicle right (2520-00-894-9532)	TM 9-2520-234-35
Direct support and general support maintenance manual including repair parts and special tool lists (including depot maintenance allowances) for Engine, diesel: turbocharged, fuel injected, liquid cooled, "V" type, 8-cylinder, w/container, assembly, Detroit diesel-GMC series — 8V71T, model 7083-7398 (2815-00-762-4500 and 2815-00-936-7659) and Detroit diesel-GMC series — 8V71T, model 7083-7399 (2815-00-134-4845)	TM 9-2815-202-34
Direct and general support maintenance manual (including repair parts list): Generator assembly, engine (300amp) Lear Siegler (formerly Jack and	

best copy available

Heintz) models G22-2 (6115-629-1149), G22-3 (2920-795-6627), G22-6F (2920-830-6660), G22-7F (2920-830-1293), and G22-9 (2920-563-0299)	TM 9-2920-224-35
Aiming post light M14, M41 and M43	TM 9-6015
Operator and organizational maintenance manual for lead-acid storage batteries	TM 9-6140-200-12
Direct support, general support, and depot maintenance repair parts and special tools list for Periscope, M17 (6650-704-3549	TM 9-6650-213-35P
The Army maintenance management system (TAMMS)	TM 38-750
Transportability guidance: Gun, field artillery, self-propelled: 175mm, M107 (NSN 2350-00-546-6635) howitzer, heavy, self-propelled: 8-inch, M110 (NSN 2350-00-439-6243) howitzer, heavy, self-propelled: 8-inch, M110E2	TM 55-2300-216-15-1
Administrative storage of equipment	TM 740-90-1
Cooling systems, tactical vehicles	TM 750-254
Lubrication order for gun, self-propelled 175mm, M107 (2350-00-436-6635) and howitzer, heavy, self-propelled 8-inch, M110 (2350-00-439-6243)	LO 9-2300-216-12

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By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:
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400		183		Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.
512		191		Figure 191, item 3 has the wrong NSN. Supply rejects orders for this item. The NSN shown here is not listed in the AMDF or the MCRL. Please give us the correct NSN and P/N.

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